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Resident Fish Habitat Management

Prepared by

U.S. Department of the Interior
Bureau of Land Management
Resident Fish Team

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Director's Preface

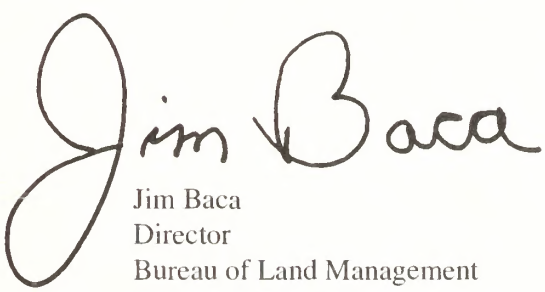
The *Resident Fish Habitat Management Plan* is a new strategy plan which is a component of *Fish & Wildlife 2000.* Presently 18 National Strategy Plans, covering a wide range of wildland resources, supplement *Fish & Wildlife 2000.* This *Resident Fish Strategy Plan* defines the resident fish goals of *Fish & Wildlife 2000*; describes the BLM's role in river, stream, and lake ecosystem management; and recommends conservation efforts for resident fish. Interagency initiatives such as *Bring Back the Natives, Animal Inn,* and the *Resident Fish Habitat Management Plan* also contain many activities promoting resident fishery resources for the social and economic benefit of the American people.

The Bureau of Land Management (BLM) is the Nation's steward for 270 million acres of public lands containing a variety of ecosystems and habitats encompassing mesas, rock canyons, towering mountains, sun-drenched deserts, lush riparian areas, pristine lakes, evergreen forests, and Arctic plains. These public lands provide homes for more than 3,000 species of plants, mammals, reptiles, fish, and birds. Additionally, the BLM manages more than 132,000 miles of streams and 2.9 million acres of surface water, and plays a major role in protecting and preserving resident fishery and water resources.

To guide the continued management of fish and wildlife resources and their habitats into the 21st century, the BLM has initiated its strategy *Fish & Wildlife 2000 - A Plan for the Future. Fish & Wildlife 2000* outlines a comprehensive master plan for the effective management of fish, wildlife, and special status plant resources on public lands, while encouraging cooperation between the BLM and all groups, public and private.

The success of any resource management program is critically dependent upon healthy ecosystems. The BLM has entered a new era of cooperative, ecosystem management in concert with other Federal, State, and local agencies, businesses, organizations, and interested individuals.

Rewarding opportunities await the adventurer visiting the BLM public lands to experience the BLM's fish and wildlife heritage firsthand—birdwatching, nature photography, wildflower viewing, hunting, fishing, or volunteering for project work. The BLM invites you to become involved in protecting these valuable resources in their natural wildland habitats. We have limitless opportunities to achieve the goals of the *Resident Fish Habitat Management Plan* through the vision of *Fish & Wildlife 2000.*



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Executive Summary

The Bureau of Land Management (BLM) manages 272 million acres of public lands, including 132,190 miles of streams and 2.9 million acres of lakes and reservoirs inhabited by resident fish. Resident fishery resources are essential to the biological integrity of the ecosystems in which they occur. These resources on BLM public lands generated $360 million for the nation's economy in 1992 (Sport Fishing Institute, 1992).

BLM's ***Fish and Wildlife 2000 - A Plan for the Future*** established national goals and objectives for managing fish, wildlife, and plant resources. The *Resident Fish Habitat Management* plan identifies specific goals and objectives needed for managing the biological integrity of aquatic ecosystems and associated watersheds. This plan complements other *Fish and Wildlife 2000* plans, such as *Anadromous Fish Habitat Management* and *Special Status Fishes Habitat Management*, by providing the final component of fisheries resource management. This plan also complements the joint U.S. Forest Service-BLM *Recreational Fisheries Policy* and the BLM *Riparian-Wetland Initiative for the 1990's.*

Resident fish are "*any species naturally occurring, either presently or historically, in any ecosystem of the United States.*" This plan identifies two goals necessary to ensure that viable populations of resident fish and the benefits they provide are maintained. These goals are "to manage for the biological integrity of aquatic ecosystems and associated watersheds for the benefit of resident fishery resources" and "to manage aquatic ecosystems and associated watersheds to provide for social and economic benefits and recreational uses by the public."

Major themes in this document are to: 1) delineate and prioritize resident fishery resources, 2) protect and restore resident fish habitat, 3) ensure an ecosystem/watershed management approach, 4) emphasize protection or restoration of native species, 5) develop public awareness and support for resident fisheries programs, 6) promote recreational uses and economic benefits of resident fish, 7) improve manageability of and access to resident fish habitat, and 8) identify research needs for resident fish. Specific implementation strategies have been developed for each of these major themes. To accomplish the goals and objectives of this plan by the year 2000 will require approximately $178 million and an additional 110 fisheries positions.

The conservation and maintenance of healthy watersheds is central to the concept of regional ecosystem management and is the overall challenge of this plan. Implementing this plan ensures healthy and productive populations of resident fish while providing public recreational and economic opportunities. Managing resident fish and their habitat constitutes wise stewardship and protects our heritage of native species and natural ecosystems for generations to come.

Unique Habitats
the Marys River Subbasin

The Marys River subbasin is a unique and valuable Great Basin river system, from the small, high-gradient headwaters streams flowing through aspen or cottonwood galleries to the meandering lower reaches of the Marys River. This subbasin, located in northeastern Nevada, encompasses a 520-square-mile watershed. The variety of riparian/aquatic habitats found in the subbasin is representative of the common stream types of northern Nevada. However, Marys River subbasin is unique because it is one of the few areas where native fish populations are not isolated and allowed to interbreed within the subbasin.

The majority of the watershed, which includes over 86 miles of the Marys River and seven tributaries, is situated on public lands administered by BLM. These lands contain some of the best Lahontan cutthroat trout habitat remaining in northern Nevada. Management of the area focuses on enhancing riparian/aquatic habitats throughout the watershed to benefit this native trout and other resident species. In addition to improving habitat conditions on streams, management will improve the marshes, springs, meadows, and uplands. The diverse habitats of this area make it valuable not only for fish, but for all wildlife.

Introduction

Background

The current fish fauna of North America is largely reflective of changes imposed by humans on natural systems. Prehistorically, movements of fish were influenced by geologic and hydrologic factors. In recent history, humans have been the major influence on the presence or absence of fish species and on the condition of aquatic habitats.

As the country was settled, aquatic habitats were altered, particularly as a result of water diversions. Habitat loss was accelerated in many areas by overexploitation of rangelands, forests, minerals, and other natural resources. Dam construction resulted in conditions favorable to the expansion of introduced species at the expense of many native species.

During most of the 20th century, fisheries management has focused almost exclusively on rearing, stocking, transplanting, and increasing the number and size of commercial and game fish with little regard to native species, natural habitats, or the ecosystems in which they occurred. More recently, there is growing interest and concern for endangered species, community ecology, and biodiversity. Fisheries managers are now broadening their concern to all species, as is society in general.

Purpose

The Federal Land Policy and Management Act (FLPMA) of 1976 and numerous other laws, regulations, policies, Executive orders, and Memorandums of Understandings (MOUs) direct the Bureau of Land Management (BLM) to manage its lands in a manner that will provide habitat for fish and wildlife and protect the quality of water resources. BLM has developed *Fish and Wildlife 2000 - A Plan for the Future* to carry out its charge. *Fish and Wildlife 2000* establishes national goals and objectives for managing fish, wildlife, and special status plant resources on BLM-administered lands.

BLM's *Fish and Wildlife 2000* plan identifies three national fisheries plans that address issues pertaining to aquatic ecosystems. The *Anadromous Fish Habitat Management* and the *Special Status Fishes Habitat Management* plans were published previously;

this *Resident Fisheries Habitat Management* plan is the final component of BLM's fisheries management strategy. This document will meet a critical need to educate and inform BLM managers and the public about resident fish habitat potential on public lands and about regional and local ecosystem management.

In the past, considerable resources and effort have been expended to restore, enhance, and protect aquatic habitats, but the effort lacked Bureauwide coordination. The Resident Fish Team was formed to assemble a national strategy to guide management actions on lands administered by BLM. This report describes resident fish resources on public lands, national and state strategies, financial and work force needs, and realized benefits to the nation.

The purpose of this document is to communicate BLM's national strategy for managing resident fish species habitat. This habitat varies from high mountain lakes to manmade reservoirs and from large river systems to small, isolated streams in arid regions.

Fish species addressed in this national strategy fall into the following categories as defined by BLM:

Resident species: Any species naturally occurring, either presently or historically, in any ecosystem of the United States.

Native species: Any species that naturally occurred within a given body of water.

Exotic species: Any species not naturally occurring, either presently or historically, in any ecosystem of the United States. (Note: while by definition not a resident species, exotic species, like brown trout, are addressed in this national strategy because of their high recreation value.)

Setting Priorities

The BLM 6720 Manual, *Aquatic Resource Management*, establishes program priorities for management of aquatic resources. BLM is to give management attention to aquatic habitats in the following order:

1 - Aquatic habitats supporting Federally listed or proposed threatened or endangered species.

2 - Aquatic habitats supporting other special status species, such as candidate species.

3 - Aquatic habitats supporting anadromous species.

4 - Aquatic habitats supporting resident species.

5 - Aquatic habitats supporting exotic species.

Policy further states that BLM shall restore and recover listed species, maintain or restore natural ecosystem functions, restore and enhance anadromous and recreational fisheries, and promote the use of native fishes for recreational use rather than nonnative or exotic species whenever possible.

The following species have been addressed in other documents and will not be addressed in this plan:

Anadromous species: Species of fish that migrate upriver from the ocean to reproduce in fresh water.

Special status species: Any species listed as threatened or endangered by the Federal government, officially proposed for such designation, Federal candidate species, BLM sensitive species, or species listed by State government as threatened or endangered.

Brook Stickleback
(Culaea inconstans)

The brook stickleback inhabits cool, clear, slow-flowing, small streams and ponds throughout the Missouri River, Arkansas River, and Rio Grande systems. Sticklebacks spawn from spring into summer at water temperatures up to 68° F. Males move into shallow water and construct a nest about 3/4-inch in diameter of stems of grass. Several females are driven into the nest through nips and nudges by the male. The females lay eggs after prodding by the male and are then driven from the nest. Following fertilization, the male guards eggs and fry until the young abandon the nest (Winn, 1960).

These small carnivorous fish (adults are about 2 inches long) are generally found alone in backwater areas or in association with fathead minnow, creek chub, and plains killifish where cover exists. They cannot tolerate habitat degradation and will quickly disappear from streams that are channelized or dewatered (Woodling, 1985).

Rio Grande Cutthroat Trout
(Oncorhynchus clarki virginalis)

The Rio Grande cutthroat trout prefers clear, cold streams and lakes. Populations are limited mostly by stream size and morphology, overwintering habitat, stream productivity, and summer cover. Unfortunately, maintaining optimal cutthroat trout habitat is not compatible with many current land use practices.

Most streams inhabited by this species have been adversely impacted by livestock grazing. Reduced vegetation within a watershed, especially in riparian-wetland areas, has led to altered stream nutrients, heavy sediment loads, increased water temperatures, modified flow regimes, and dramatic changes in stream morphology.

Typical of native cutthroat trout, the Rio Grande cutthroat does not compete well with introduced salmonids. It readily hybridizes with other forms of cutthroat trout, as well as with introduced spring spawning trouts (i.e., rainbow trout). The species is vulnerable to angling and populations are quickly depleted in areas where fishing pressure is heavy.

Historically, the Rio Grande cutthroat trout was once widely distributed throughout Colorado and New Mexico in the Rio Grande, Pecos River, and Canadian River drainages. There are some indications that the species may have inhabited areas in Texas and Mexico, but these occurrences have not been confirmed by collections. However, distribution of the species is now limited to select headwaters streams of the upper Rio Grande in New Mexico and Colorado.

On BLM-administered lands in Colorado and New Mexico, the species is know to occur in one stream in each state. BLM has never conducted an intensive aquatic inventory in New Mexico, so the species may actually occupy more waters than presently known. However, the fact remains that existing distribution and population densities of the species have declined dramatically.

Resident Fisheries Program

Current Status

Resources

BLM-administered lands contain an abundance and diversity of resident fish resources that are prized for their recreation, historic, and economic values. BLM manages over 132,190 miles of fisheries stream habitat and over 2.9 million surface acres of lake and reservoir habitat primarily in the Western States (Table 1). BLM has some management responsibilities on many large main-stem reservoirs throughout the West; in addition, thousands of reservoirs of various sizes have been built on BLM-administered lands, primarily to provide water for livestock.

BLM waters are inhabited by a wide variety of resident fish species, from the ever-popular rainbow trout to virtually unknown species like the orangethroat darter. Considerable information is known about some of these species and is totally lacking for others. All of these species are important to the natural function of their associated ecosystems. BLM is developing national strategies that focus on issues like biodiversity,

Table 1. Resident Fisheries Current Habitat Figures

State	Stream Miles	Lakes & Reservoir Surface Acres
Alaska	115,000	2,600,000
Arizona	700	14,200
California	850	163,000
Colorado	1,900	17,600
Eastern States	20	3,620
Idaho	2,820	750
Montana	720	6,670
New Mexico	260	120
Nevada	1,400	33,190
Oregon/ Washington	3,200	32,770
Utah	3,390	15,230
Wyoming	1,930	6,430
TOTALS	**132,190**	**2,893,580**

Biodiversity & Regional Ecosystem Management

Biodiversity is the variety of life and all that sustains life. At the community level, it includes the variety of species and the genetic variety within species found within a particular habitat, such as a stream. At the ecosystem level, it includes the variety of communities, the physical attributes (water, soil, etc.), and the processes that affect them. At the regional ecosystem level, biodiversity is the combination of the variety of ecosystems found within a geographic area, such as a river basin. Management goals at a regional ecosystem level are characterized by a compatible level of economic productivity, a high level of biodiversity (full array of native species), and jurisdictions and ownerships working together to achieve common goals and objectives.

Each species has its own importance, and maintaining the full array of species provides many benefits for humanity. For example, the cancer-fighting Pacific yew tree has great medical significance for humans. Biodiversity is also important because is has intrinsic value; it supports the integrity and resilience of ecosystems on which numerous species, including humans, depend; it provides the genetic variation and distribution of that variation necessary for the continued evolution of new forms under changing conditions; and it adds variety and interest for appreciation and aesthetic enjoyment of nature.

ecosystem management, native fish restoration, and interdisciplinary and integrated resource management. *Bring Back the Natives*, cooperative watershed management, and challenge cost share initiatives are all examples of BLM's commitment to implement these strategies.

Fishery resources on BLM-administered land also play an important role in recreation. Recreational fishing is a cherished American tradition that significantly contributes to the social and economic well-being of the Nation. The social benefits of recreational fishing are many; fishing provides a relaxing and healthful source of recreation to millions of individuals and families. Demand for these opportunities is rapidly increasing. Recreational use of water resources provides leisure benefits to over 4.5 million fisherman, 3.2 million boaters, and 2.5 million water-based recreation users and provides important economic benefit to our nation. Recreational fishing activities generated $360 million for the nation's economy in 1992 (Sport Fishing Institute, 1992).

Funding/Staffing

The late 1980's were a low point in both funding and staffing for the BLM fisheries program. It is estimated that BLM spent approximately $1.4 million on fisheries in 1986. There were 26 fisheries biologists working for the Bureau in 1987 after a high of 63 in the late 1970's. At least half of that staffing and funding has been devoted to anadromous fisheries. Today the fisheries program is investing over $7 million annually and has 55 biologists.

Future Challenge

Conservation and maintenance of healthy ecosystems is central to the concept of watershed management and is the overall challenge of this strategy document. The BLM must resolve many problems to meet this challenge.

Watershed problems are most quickly detected in deteriorated riparian and stream conditions. Nonpoint source pollution causes increased water turbidity and sedimentation and impacts aquatic communities. If riparian and upland habitats are in good condition, fisheries resources are most likely to be healthy. These concerns are most easily addressed through ecosystem management and require a strong fisheries component.

As management becomes more oriented towards regional ecosystems and watersheds, close cooperation with other land management agencies becomes more critical, requiring joint planning and management between agencies and across administered boundaries. It is important to maintain good cooperation and coordination with State fish and wildlife agencies. Such coordination has been most effective where BLM offices include fisheries, hydrology, and riparian

specialists. Currently, these specialists are not available in all field offices. State agencies are encouraged by recent efforts such as *Fish & Wildlife 2000* and the *Riparian-Wetland Initiative for the 1990's*, which encourage BLM's overall commitment to fisheries and riparian-wetland management.

The public frequently is not familiar with BLM and is unaware that it has significant fisheries resources or habitat management responsibilities. Commodity users of BLM-administered lands may view fisheries programs as obstructions. However, some successful fisheries and riparian-wetland projects have demonstrated that sound, cooperative management generally benefits all users and may be a prerequisite for long-term sustainability of commodity uses. Sporting and conservation groups have exhibited a growing desire to participate in BLM's fisheries and riparian programs. These groups provide a valuable source of information in management planning and are a growing source of labor and financial support to supplement appropriated BLM funding. One of BLM's management challenges is to reconcile the concerns and interests of diverse user groups.

Internal support services for the resident fisheries program (i.e., data management, training, and research) have often been developed solely through the interest and abilities of individual biologists. These services are critical to the implementation of this plan. These efforts require Bureauwide consideration.

Future management must balance the want of the general public to have access to recreational sites with the need to protect both habitat and the rights of private landowners. Access to riparian areas is sometimes curtailed because of private ownership or poor physical access. Conversely, uncontrolled public access can lead to trespass and destruction of important riparian areas and fish habitat.

Currently, adequate staffing and funding is not available to meet the challenge. Implementation of BLM's *Resident Fish Habitat Management* strategy by the year 2000 will require $179 million, which includes funding for 110 new fishery biologists.

Law Enforcement

Fish and wildlife law enforcement is generally the responsibility of State fish and wildlife agencies. However, pursuant to various laws and regulations (e.g., FLPMA, Title 43 - Code of Federal Regulations, Sikes Act, etc.), BLM special agents and rangers are authorized to enforce Federal laws and regulations related to public lands and resources, and cooperate with the regulatory and law enforcement officials of any State or political subdivision. BLM special agents and rangers are also involved in conducting compliance and enforcement actions related to special recreation use permits and access and trespass conflicts.

Increasing resident fish recreational opportunities while ensuring protection of the resource requires adequate enforcement. To ensure adequate enforcement and to prevent dissatisfaction of certain interest groups and publics which leads to proposals for management changes and/or closures, BLM will:

- Provide assistance to State fish and wildlife conservation agencies in enforcing State and local fish protection laws and regulations.
- Enforce subsistence fishing regulations in Alaska, when so required.
- Respond to user conflict situations such as blocked access, trespass, fishing interference, or property destruction, and take enforcement action as necessary.
- Promulgate and enforce supplementary rules in cooperative habitat management areas that are consistent with and complement the regulations and restrictions made applicable to such areas by State fish and wildlife protection agencies.
- Enforce Federal fisheries protection laws and regulations, including the use of public land area stamps, when so required.

Inconnu or Sheefish
(Stenodus leucichthys)

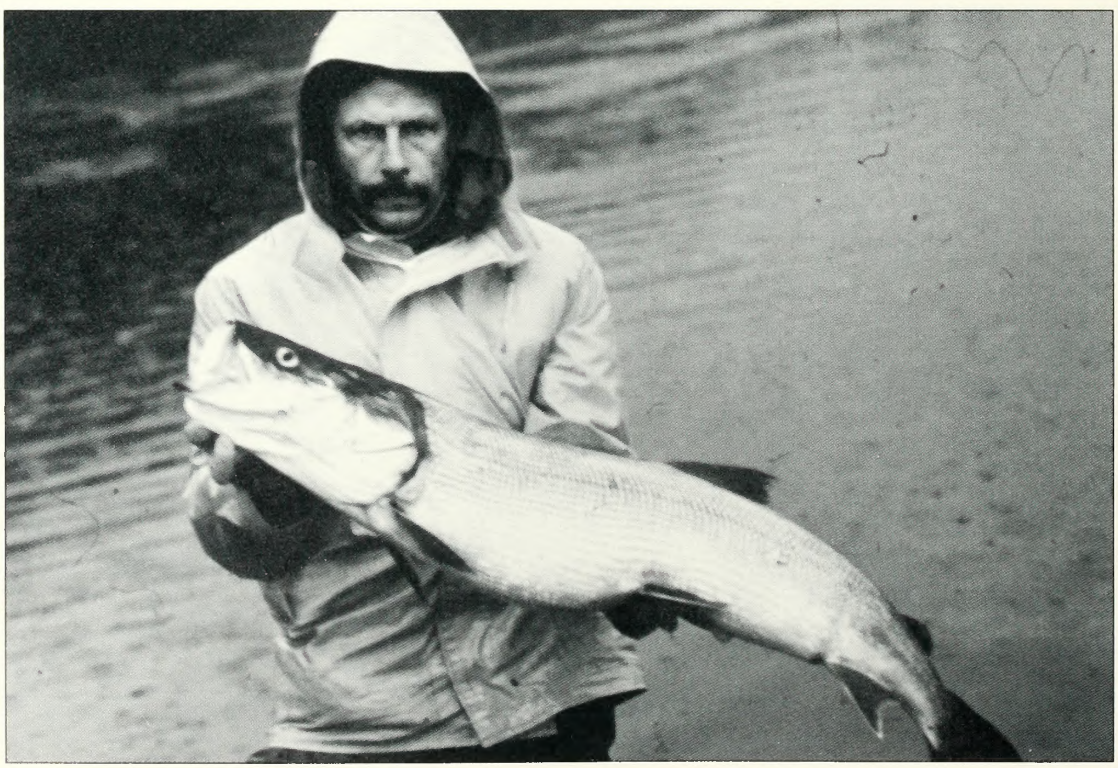
The inconnu is the largest of all the whitefish species, reaching lengths of 30 inches and weights of 50 pounds. It is a predatory fish and is characterized by a long, laterally compressed body; a large mouth; and a protruding lower jaw.

The inconnu is distributed exclusively in Arctic and sub-Arctic North America and Siberia. In Alaska, the species consists of five distinct populations, depending on location, that include: Minto Flats, Upper and Lower Yukon River, Kuskokwim, and Kobuk-Selawik. These separate populations generally do not mix, though hybridization with other whitefish species does occur as a result of broadcast spawning.

Fish from the Minto Flats and Upper Yukon are year-round, freshwater residents, whereas the Lower Yukon and Kuskokwim River fish overwinter in the delta areas of these large rivers. Inconnu from the Kobuk-Selawik population overwinter in the brackish waters of Selawik Lake and Hotham Inlet. All populations migrate upstream at ice breakup. Early upstream movements are apparently related to feeding, but soon turn into spawning migrations. Studies indicate that spawning occurs every 2-3 years, during late summer or early fall, and usually at night. Inconnus are broadcast spawners that prefer clear running rivers and streams.

Commercial, subsistence, and sport fisheries for the inconnu are all present in Alaska. A commercial fishery exists in the Kotzebue area and subsistence fisheries of considerable size occur along the Kobuk-Selawik, Yukon, Koyukuk, and Kuskokwim Rivers. Though localized in abundance, inconnus provide quality sport fishing opportunities due to their substantial size and tremendous fighting capabilities.

As is the case with most Alaska fisheries, inconnu habitat is probably in stable condition (e.g., little human-induced disturbance). Sport fishing pressure is relatively light due to the fish's location in relation to population centers. However, subsistence take could potentially impact local populations.



Alaska Department of Fish and Game

National Strategy

Goals

Primary Goal

To manage for the biological integrity of aquatic ecosystems and associated watersheds for the benefit of resident fishery resources.

Secondary Goal

To manage aquatic ecosystems and associated watersheds to provide social and economic benefits and recreational uses by the public.

To attain the resident fish goals, eight objectives have been developed and specific strategies for each objective have been formulated.

Objectives Pertaining to the Primary Goal

Objective 1

Prioritize resident fishery resources, uses, and management opportunities.

The focus of this objective is to inventory and identify resident fishery resources, their uses, and management opportunities in order to make sound management decisions. Inventory information provides the foundation for land use and activity planning, monitoring, and habitat improvements. Data are needed to evaluate impacts of management action alternatives and to develop site-specific management objectives and actions for activity plans. Inventory and monitoring data are needed to determine priorities of uses and

management opportunities. Intensity of inventory varies based on needs (i.e., low-level baseline inventories may be required for identifying resource values while high-intensity inventories will be required to implement plans and habitat improvement management).

Habitat and population monitoring are needed to determine the effectiveness of management activities in achieving resident fishery resource objectives and to develop revisions to management objectives and associated actions.

Strategies

- In cooperation with State and other Federal agencies, document the occurrence, distribution, and condition of resident fish on BLM-administered lands to facilitate ecosystem management.
- Inventory a total of 127,000 miles and 534,000 acres of resident fish habitat.
- Analyze inventory data to identify lands administered by BLM that are essential, historical, or potential habitat for resident fish.
- Analyze inventory data to identify uses and management opportunities for resident fishery resources.
- Use all appropriate Bureau-approved automated data storage and retrieval systems, including GIS, to maintain inventory records and facilitate their use.
- Monitor and evaluate ongoing and proposed management activities to ensure that objectives for resident fishery resources are being met.
- Ensure that resident fishery objectives and associated monitoring schedules are developed for all activity plans where resident fishery resources exist or have the potential to be reestablished.
- Analyze inventory and monitoring data to develop and/or revise planning documents and prioritize actions affecting resident fishery resources.
- Monitor habitats and populations to determine current status of resident fishery resources and presence of undesirable species.

Objective 2

Protect, restore, and/or enhance resident fish habitat and the ecosystem in which it occurs.

Protection, restoration, and enhancement of resident fishery resources requires ecosystem management at the watershed level. Planning and cooperative management agreements with other landowners are needed to eliminate conflicts or reduce impacts through avoidance, minimization of adverse impacts, compensatory actions, or other mitigation measures. In addition to prescribing management activities that could benefit resident fishery resources, integrated activity plans may also identify structural improvements that could be used when other restoration efforts are inadequate to achieve the desired level of improvement. Currently, 556 Habitat Management Plans (HMPs) have been identified for development and another 198 require revision to incorporate resident fisheries objectives Bureauwide.

Current activity plans have objectives that address the protection, restoration and/or enhancement of 1,700 miles and 39,500 acres of resident fish habitat. Of that, 50 percent of existing stream miles and 32 percent of lake/reservoirs habitat currently are meeting management objectives. However, 98.7 percent (130,472 miles) of the stream miles and 98.5 percent (2,856,500 acres) of the lake and reservoir habitat Bureauwide have no objectives specific to resident fish habitat management.

Special designations of critical or unique waters may also provide protection of resident fishery resources. Currently there are 3,200 stream miles/1,500 surface acres in Areas of Critical Environmental Concern (ACECs), 90 stream miles in wilderness areas, 1,600 stream miles/250 surface acres in National Conservation Areas, and 1,100 stream miles in Wild and Scenic Rivers. In addition, there are 1,200 stream miles/5,600 surface acres in Wilderness Study Areas and 1,980 stream miles/860 surface acres that have been proposed for special designation.

Strategies

- Use ecosystem plans, cooperatively developed, to encourage all landowners to implement practices to protect resident fishery resources.

- Ensure that land transfer actions retain resident fishery waters and associated riparian and uplands in public ownership, unless disposal will be in the public interest, as determined through the land use planning process.

- Ensure adequate water quality for resident fish by complying with the Clean Water Act or other relevant State legislation.

    - Identify resident fishery resources as a beneficial use of water.

    - Determine water quality standards to protect resident fish habitat.

- Recommend that resident fish and their water quality standards are included in State water quality regulations.

- Incorporate measures to protect resident fishery resources in planning documents.

  - Revise Resource Management Plans (RMPs) and Management Framework Plans (MFPs) to include resident fishery resource objectives.

  - Use an ecosystem management/watershed approach, emphasizing the use of interdisciplinary teams in formulating resident fishery resource objectives, multiple-use management strategies, and proposed actions.

  - Develop 556 new activity plans, revise 198 existing activity plans, and implement existing activity plans to protect, restore, and/or enhance resident fishery resources.

  - Increase protection of resident fish by eliminating land use conflicts or by mitigating those conflicts that cannot be eliminated. Assure compliance with mitigating measures and monitor actions to determine their success in protecting resident fishery resources or mitigating their impacts.

- As appropriate, identify resident fishery resources that require special designation to maintain critical or unique habitat through land use planning or other processes.

- Maintain biological integrity by implementing habitat programs designed on an ecosystem basis to conserve resident fisheries and their habitats.

Objective 3

Ensure an ecosystem management/watershed approach is incorporated into existing and future management plans.

BLM fisheries management programs have traditionally focused on single species, rather than on aquatic communities. Moreover, the agency's approach to habitat has tended to focus on portions of rivers within the agency's jurisdiction, instead of an **ecosystem**

approach that recognizes that all actions within a **watershed** are inextricably bound.

Scientists and managers are increasingly aware that successful management of resident fish species requires a perspective that includes entire watersheds, rather than individual reaches or artificial boundaries. Such an ecosystem approach incorporates all features of aquatic ecosystems, including physical, chemical, and biological components. Equally important, however, is the need to transcend traditional boundaries, both within the agency and among different government and private organizations.

To ensure that the agency adopts an ecosystem approach to resident fisheries management, these concepts must be incorporated into BLM's 141 Land Use Plans, which include existing and proposed RMPs as well as older MFPs. As of September 30, 1992, the agency had completed 79 RMPs. Over the next 5 years, the agency is scheduled to complete 62 new plans and revise 6 existing RMPs. Resident fisheries concerns should be addressed in all 68 of these RMPs. All completed RMPs should be reviewed to ensure that resident fish concerns are addressed. These plans constitute an important opportunity to include the goals and objectives of the *Resident Fish Habitat Management* plan, including the strategies outlined below for ecosystem-oriented management planning.

Strategies

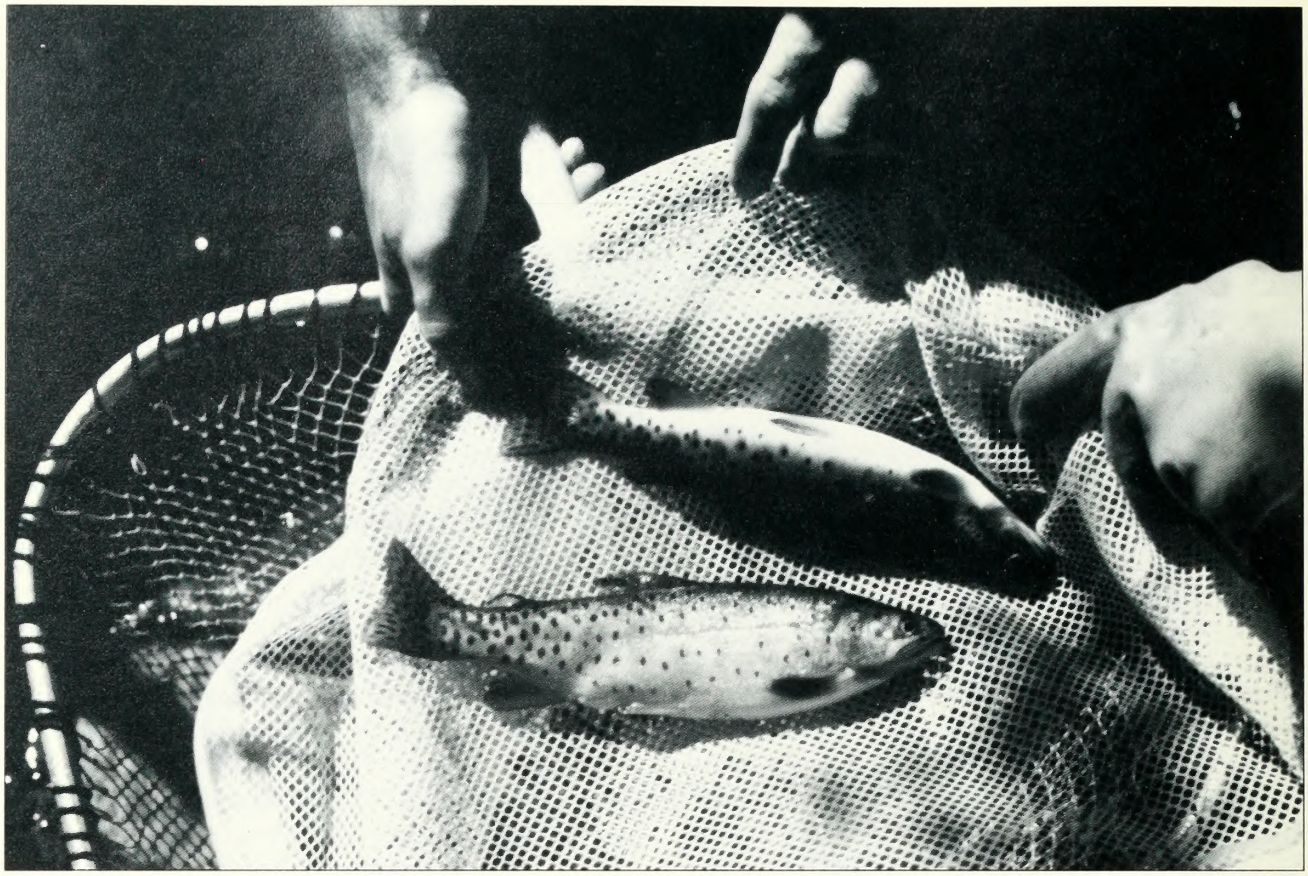
- Use an ecosystem approach incorporating physical, chemical, and biological considerations into the planning system. Plans should:
  - Identify resident fish communities present in the watershed.
  - Compare the current stream and riparian conditions with their historic state, including channel conditions, adjacent land use, water quality, and the overall ability of the ecosystem to support resident fish species.
  - Evaluate how closely the species, communities, or habitat types targeted in the Land Use Plan correspond to the natural historic conditions of the stream.
  - Identify the elements, if any, causing destabilization of resident fish habitat, including instream conditions, adjacent land use, or other management actions.
  - Identify optimum methods for addressing these sources of destabilization basinwide.
  - Include specific measurable objectives and actions for managing habitat of resident fish species.
- Evaluate internal agency programs to ensure all planning documents are consistent with the objectives of the *Resident Fish Habitat Management* plan, particularly in incorporating an ecosystem approach.
  - Examine whether current BLM management activities in the watershed are contributing to destabilization or preventing recovery of resident fish species.
  - Evaluate whether BLM programs within the watershed are compatible with the goals and objectives of the *Resident Fish Habitat Management* plan. For example, determine whether range and forest management activities support the goals of the plan.
  - Determine how closely Land Use Plan boundaries correspond to the watershed boundaries and propose adjustments as needed.
- Coordinate with other agencies and private organizations to eliminate overlap and duplication and to address gaps in programs.

Objective 4

Emphasize protection or restoration of native species within their historic ranges.

Protection and restoration of native species is recognized by all Federal and State fisheries management agencies. Significant reductions in native fish populations and the habitat they historically occupied have been documented in all areas of the nation, but particularly in the Western States. There are two primary reasons for this downward trend:

1. Habitat degradation through human-caused impacts, and
2. Introduction of exotic or nonnative fish.



In the Western United States, fisheries habitat degradation is widespread resulting from numerous land use activities, such as livestock grazing, harvest of forest products, instream flow depletions, mining, and road construction. Land use activities impact fish habitat both directly and indirectly. For example, livestock grazing may result in trampled streambanks and loss of riparian vegetation, which reduces escape cover and indirectly increases water temperatures due to increased exposure of the stream to the sun. Logging and associated road construction can directly result in increased sediment loads in streams and indirectly alter watershed and stream hydrology. Alaska, with its thousands of stream miles and lakes, serves as the only exception to widespread degradation of resident fishery habitat within the Western United States. Due to the extreme remoteness and harsh climatic conditions, fisheries habitat remains in near pristine condition in much of Alaska.

The introduction of exotic and nonnative resident fish species has had a significant impact on native fish populations. Typically, introduced fish prey on native species, compete with them for food and habitat, and compromise genetic integrity through hybridization. Introduced fish species have resulted in significant population declines, displacement from historic range, and elimination of some populations of native species.

Biodiversity is the combination of communities, individual species, and genetic variation within species, and the process by which these components interact within and among themselves. A decline in biodiversity can occur if the population of a single species significantly declines limiting genetic variation within that species. Introduction of a nonnative species usually results in a decrease of the long-term stability of an aquatic ecosystem and the eventual loss of diversity. This is most dramatic and evident when an introduced species preys directly on native fish.

Research and management have shown that it is best to protect and maintain the natural ecosystem and leave a species in the habitat where it originally evolved. The value of a native species is often not realized or appreciated until its population has declined to the point where it no longer functions as an integral part of an ecosystem. In many cases, the value of a particular native species may simply be in the role it plays in relation to other plants and animals, or in biological terms, the ecological niche it occupies. It is for these

reasons that the Bureau has supported the *Bring Back the Natives* initiative specifically designed to protect, maintain, and augment native fish populations. The intent of maintaining natural ecosystems is supported in several Bureau manuals.

Strategies

- Maintain or restore natural biodiversity and protect genetic integrity of native species through ecosystem management concepts at the watershed level.

- Determine species occurrence, range of species present, historic range of species present and those extirpated.

- Assess current habitat condition, potential of the habitat given existing physical limitations, and limiting factors suppressing native fisheries.

- Develop specific objectives in planning documents to protect or restore native fisheries habitat and reestablish native fish populations.

- Protect habitat for native species by acquiring additional habitat through land exchange, retaining essential habitats in Federal ownership, securing water rights for instream flow or for fisheries purposes in accordance with individual State procedures, and ensuring adequate water quality through control of point and nonpoint source pollution and basic watershed improvements.

- Coordinate management efforts with other Federal, State fish and wildlife agencies, conservation groups, and other interested parties to improve public knowledge and cooperative management of native fish resources.

Objectives Pertaining to the Secondary Goal

Objective 5

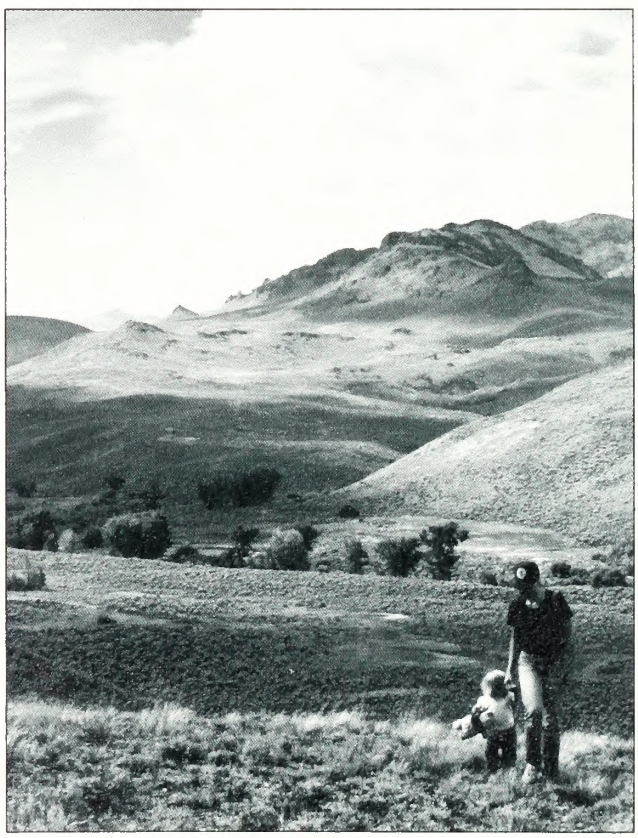
Develop public awareness and support for resident fisheries programs and promote partnerships with other agencies, landowners, interest groups, and individuals.

An ever-increasing number of people are taking part in activities related to both the consumptive and nonconsumptive use of resident fishery resources. Recreational, commercial, and subsistence use of fish and the waters they inhabit continues to rise.

BLM welcomes the multiple uses of fisheries resources on lands it manages. However, BLM realizes that effective management requires cooperation between Bureau programs and the public. Input from individuals, landowners, local governments, interest groups, other Federal and State agencies, and academia, is vital to proper fisheries management. Coordinated and responsible management promotes a greater awareness and understanding of Bureau management objectives and willingness of interest groups and individuals to join with BLM in maintaining healthy fisheries.

Environmental Education

Public concern in environmental matters has led BLM to become involved in environmental education. Much of the educational thrust is directed toward the children and young adults in our schools, user groups, outdoor enthusiasts, and other interested individuals. Private sector partners have helped in this effort by providing funding and by developing and making



fisheries related activities available to BLM. These activities are shared with school-aged children during National Fishing Week or other outdoor day programs. There are currently 67 education projects or plans identified as ongoing among all BLM states.

Outreach Partnerships

BLM has and is developing cooperative partnerships with a variety of public land user groups and individuals as well as private companies. Potential partners include, but are not limited to: conservation groups, the recreational fishing industry, local government, private landowners, the outdoors publication industry, and nonfisheries-oriented commodity groups. These groups aid in managing fishery resources by becoming involved in rehabilitation, enhancement, access, and environmental education projects. Help comes in many forms including volunteer labor, technical knowledge, printed information, funding, access to land, and project supplies.

BLM recognizes the importance of a strong working relationship in the form of outreach partnerships. A total of 32 partnership projects related to resident fisheries are now in place. Fisheries biologists have identified 225 additional plans/projects that would benefit the fishery resource and the public if implemented.

Promotional Activities

With the increasing demand for outdoor recreation, fisheries biologists, in cooperation with the recreation program and its *Recreation 2000* initiative, are developing strategies to inform visitors of ways to enjoy fishery resources and to showcase projects and techniques used in day-to-day management.

There are 61 BLM-initiated promotional activities currently in operation. Another 33 plans/projects related to promotion are developed, but are not in operation due to funding constraints.

Strategies

- Coordinate management between BLM and other agencies and institutions through formal documents such as Memorandums of Understanding and Cooperative Agreements.
    - Expand and continue to implement an Environmental Education Program that would include education activities, curriculum devel-

opment, and information dissemination through guest lectures, field trips, workshops, cooperative projects, and reading material.

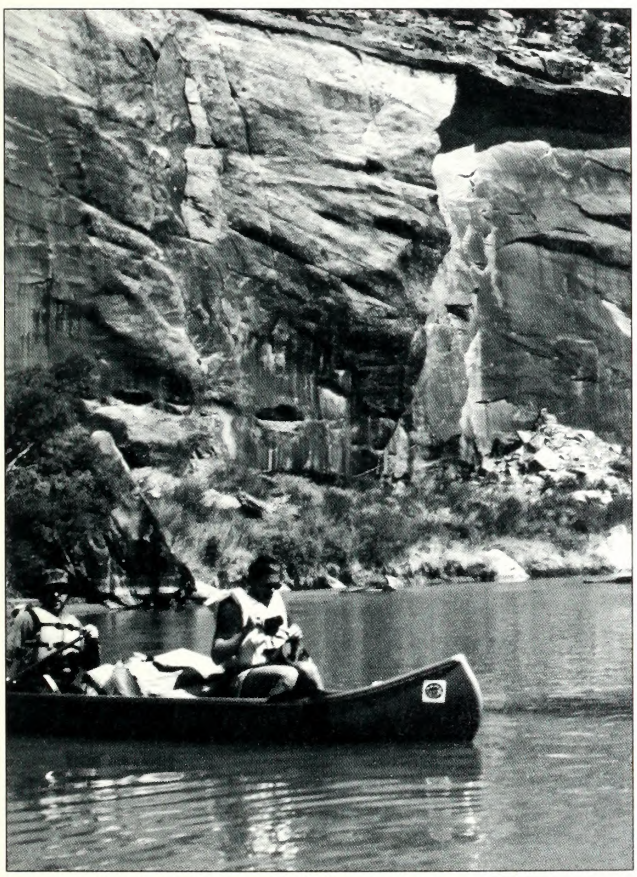
- Develop cooperative partnerships with concerned public land user groups, individuals, and private companies.

- Coordinate and train within BLM to promote development and use of fisheries resources.

Objective 6

Promote existing and potential recreational and other uses and economic benefits, while ensuring protection of resident fishery resources.

Development and maintenance of recreation sites are budgeted within the Wildlife and Fisheries, Recreation Management, and Recreation Maintenance Programs. Close coordination among these programs is absolutely essential. In addition, interdisciplinary cooperation among all BLM programs (i.e., Range, Soil/Water/Air, Forestry, Minerals, etc.) is necessary to assure maintenance, protection, and enhancement of the resident fisheries habitat while providing public access.



Numerous types of recreation sites have been developed on BLM lands including: campgrounds, concessions, roads, fishing docks, interpretive signs, access stiles, access ramps, trails, viewing boxes, boat access, boat ramps, parking, day-use sites, and access for the physically challenged. However, many BLM fishing sites will remain "undeveloped" to accommodate more primitive recreational pursuits.

BLM currently maintains access/campgrounds/etc., at over 143 sites which promote recreational activities based on residential fishery resources. Among these sites, 23 have been identified for expansion or upgrade. In addition, 103 new areas could be developed during the next 8 years. Development, expansion, and maintenance of recreation sites will require approximately $65 million.

Strategies

- Promote an understanding of ecosystems, aquatic resource conservation, and angler ethics.

- Identify and develop new recreation sites to support the recreational fishing policy (USDA and USDI, 1988).

- Expand existing recreational sites to accommodate growing fishing demands.

- Maintain existing recreational use sites.

- In cooperation with partners, promote establishment of watchable wildlife sites incorporating resident fish resources.

Objective 7

Secure lands and waters important to improve manageability of or access to resident fishery habitats.

BLM's land ownership pattern is often scattered (i.e., "checkerboard") and is not situated for the best management of resident fishery habitats. In some cases, private or other landowners may inhibit direct recreational or managerial access to BLM-administered lands. In addition, waters and lands in non-Federal ownership within specific watersheds may be managed for many uses, often with conflicting objec-

tives, in ways which adversely affect fishery habitats on BLM lands.

The Bureau has many avenues to follow to assure proper management of fishery habitats on BLM-administered lands. The Bureau functions within mandated laws, regulations, and guidelines to foster multiple-use management which can protect and maintain fishery habitats. Individual State regulatory processes often can be used to enhance the management of watersheds to the benefit of waters on BLM lands (i.e., minimum instream flow requirements). BLM can initiate partnerships and cooperative agreements with other landowners and managers to foster the enhancement or maintenance of fishery habitats. With an active Lands Program, the Bureau can initiate exchanges, easements, donations, and acquisitions of lands and water to improve manageability of resident fishery habitats. Coordination with other Federal, State, and local agencies is important to protect the rights and resources of private landowners.

The acquisition of land, water, and water rights, by whatever means, is projected to require at least $28 million over the next 8 years. This includes proposed Land & Water Conservation Fund acquisitions. In lieu of purchasing, lands and waters can be secured through management partnerships, cooperative agreements, donations, exchanges, and easements.

Strategies

- Initiate partnerships or cooperative agreements to accommodate management of resident fishery resources.
- Identify and prioritize opportunities to secure lands, water, and access easements.
- Secure easements to public fishing waters.
- Secure lands necessary to facilitate ecosystem management.
- Secure lands necessary to provide access to public fishing waters.

- Secure sufficient water to provide quality habitat for resident fisheries.

Objectives Pertaining to Both Goals

Objective 8

Identify and design national and regional research and study needs, incorporating ecosystem management concepts, for the conservation and management of resident fishery resources.

BLM-administered lands contain many unique populations of resident fish and an even greater number of unique habitats (including arid land streams and springs). There are many questions that need to be answered to adequately manage them within a multiple-use scenario. Major research needs include:

- Assessing habitat requirements and life histories for resident native fish.
- Evaluating native fish reintroduction.
- Describing fish and invertebrate communities.
- Modeling long-term effects of various land use practices.
- Identifying consequences of long-term environmental changes.

To enable integrated Bureau management teams to conserve and manage resident fish, research must answer management's current questions, provide models for new management challenges, and provide baseline data to help managers meet unspecified long-term climate and use-based changes.

Elements of resident fish research involve other agencies, partners, universities, and the public at large. Research will be undertaken in consultation and partnership with all affected entities.

Many actions currently being considered by the Bureau will assist the development of the state-by-state and Bureauwide research plans. It is assumed this research will strengthen the Bureau's anadromous and special status fish management as well as resident fish management. It is also assumed research to protect and restore native fishes will be given highest priority.

Currently, BLM has identified 172 studies that will require approximately $8.8 million to implement.

Strategies

- Develop long-term resident fish research needs by the end of 1995 with a Bureauwide consolidation by the end of 1996. Needs will be reviewed and revised every 5 years.
- Identify and prioritize research needs for native species within their historic ranges.
- Support coordinated resident fish research efforts among other Federal, State, academic, and private researchers.

Coastal Cutthroat Trout
(Oncorhynchus Clarki)

Coastal cutthroat trout are distributed along the Pacific Coast from northern California's Eel River to Prince William Sound, Alaska. In Oregon and Washington, coastal cutthroat trout extend to the crest of the Cascade Mountains and in British Columbia and Alaska to the crest of the Coast Range. Their occurrence corresponds closely to the distribution of the coastal forest in the Pacific Northwest.

Coastal cutthroat trout tend to spawn in very small tributaries. Young fry move into channel margin and backwater habitats during the first several weeks after emerging from redds, eventually rearing in pools. During the winter, juvenile cutthroat trout use low-velocity pools and side channels with complex habitat created by large wood.

Habitat use by juvenile cutthroat trout is affected by interactions with other salmonids. While juveniles prefer to rear in pools, young-of-the-year cutthroat trout may be displaced into low-gradient riffles by dominant coho salmon *(O. kisutch)*. Adults select small tributaries for spawning and early rearing to help reduce competitive interactions between cutthroat and steelhead *(O. mykiss)* trout or coho salmon. Differential selection of spawning habitat may also help to minimize hybridization with steelhead.

During a long-term research program in the Alsea watershed (1959-1973), cutthroat trout populations were reduced by clearcut logging (with no buffer strips) on an experimental stream. Populations remained low 10 years after logging. A recent study has shown continued negative effects on cutthroat trout densities in the treatment (clearcut) stream 23 years after logging. Initial reductions after treatment may have been caused by elevated temperatures from an open riparian canopy. However, long-term reductions appear to be the result of a significant decline in the amounts of large woody debris found in clearcut streams.

Funding and Personnel Needs

BLM requires increased funding and additional fisheries expertise to meet the goals and objectives of this *Resident Fish Habitat Management* strategy. This section reflects estimated needs through the year 2000.

Adequate personnel with appropriate qualifications are needed to carry out this strategy. Table 2 identifies fishery personnel needed. Additional personnel, such as range, engineering, and contract specialists are required to implement this strategy.

Table 3 summarizes states' funding needs; funding requirements relative to specific objectives are shown in the State Strategies section. The costs in Table 3 include personnel, contracting, engineering, supplies, etc.

Table 2. Personnel Needs - Fishery Biologists*

State	Existing	Additional	Total
Alaska	6	14	20
Arizona	3	5	8
California	4	12	16
Colorado	4	0	4
Eastern States	0	0	0
Idaho	6	27	33
Montana	0	12	12
Nevada	4	5	9
New Mexico	1	2	3
Oregon/ Washington	24	10	34
Utah	0	21	21
Wyoming	3	2	5
Totals	**55**	**110**	**165**

* Based on 1992 projections.

Table 3. Funding Needs by State

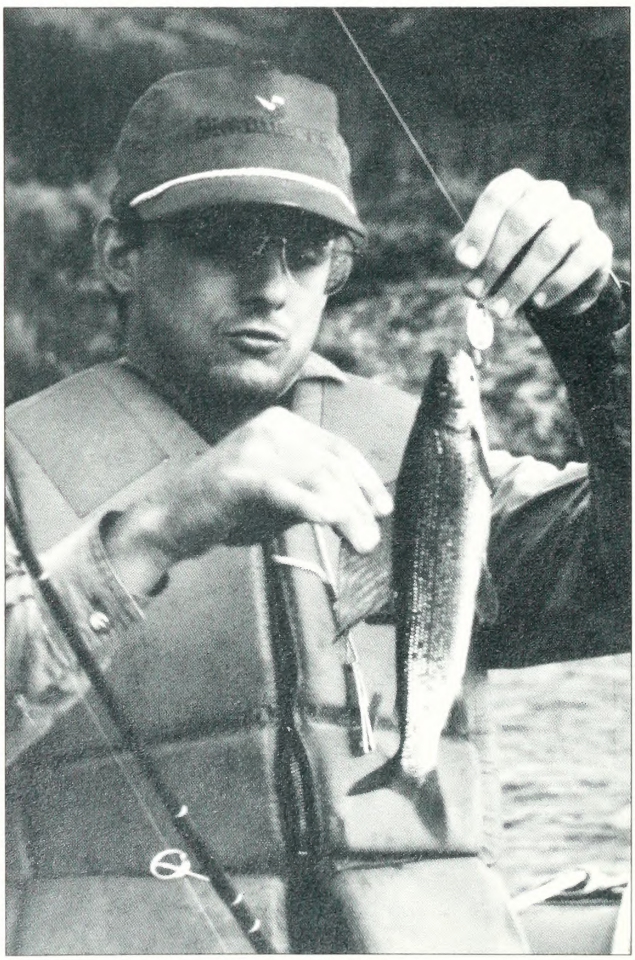
State	Estimated Cost ($000)
Alaska	24,772
Arizona	38,659
California	23,295
Colorado	4,625
Eastern States	304
Idaho	19,405
Montana	27,271
Nevada	7,799
New Mexico	4,467
Oregon/ Washington	19,715
Utah	2,621
Wyoming	6,145
Total	**179,078**

Program Benefits

Implementation of the *Resident Fish Habitat Management* plan will result in many benefits. The most important of these is to provide for healthy and productive populations of resident fish through incorporation of regional ecosystem management concepts. Concerted efforts to preserve, restore, and improve habitats will protect our heritage of native species and natural ecosystems. This plan strives to prevent the detrimental effects of genetic introgression of wild populations or interspecific competition from nonnative species. This plan also provides objectives and guidance for the management of resident fishery resources to be incorporated into all levels of activity plans.

A secondary benefit from maintaining healthy resident fishery resources is to provide public recreational fishing opportunities. The *Resident Fish Habitat Management* plan recognizes the need for a partnership between fisheries and recreation managers. Emphasis is placed on recreational fishing access through easements and rights-of-way, and construction of docks, trails, boat ramps, and parking facilities. The placement of artificial habitats is coordinated with fishing sites to increase fishing success. Angler amenities built in association with access sites, such as restrooms and fish cleaning stations, also will serve the physically challenged.

Healthy resident fishery resources on public lands also provide economic benefits. From data gathered in 1990, it is estimated that over 2 million visitor days were spent fishing on BLM-administered lands. Economic impact estimates (Sport Fishing Institute, 1992) indicate that recreational fishing activities on BLM-administered land accounted for nearly $360 million in total expenditures. This translates into an estimated 11,500 jobs being supported by recreational fishing on BLM lands. Much of this amount is spent on fishing tackle, which is a large nationwide industry employing many Americans. Meeting the future demand for quality angling opportunities on BLM-administered



lands will assist in maintaining this industry. Part of the money spent on tackle and fishing licenses is invested directly back into the fishery resource through various Federal acts, cost share partners, and assistance agreements.

There are several other benefits from improving resident fishery habitats. Healthy fish populations require good quality water. Maintaining and improving water quality is mandated by the Clean Water Act. Meeting this requirement is facilitated by restoring and maintaining healthy riparian-wetland ecosystems. Properly functioning riparian-wetlands ecosystems benefit wildlife and other aquatic organisms, filter runoff, absorb energy from floodflows, provide desirable recreation sites, etc. Proper management of uplands in a watershed reduces siltation and nonpoint source pollution and ensures continued productivity.

Clearly, from a recreational, economic, biological, aesthetic, and ecosystem standpoint, implementation of the *Resident Fish Habitat Management* plan will provide many benefits. It will also demonstrate how a partnership between government and non-government agencies and the private sector can meet common goals and objectives. Partnerships ensure fishery resource on BLM-administered lands continue to provide an enduring source of sustenance and enjoyment for all Americans and a continuing flow of social and economic benefits to the Nation.

State Strategies

Alaska

There are 115,000 miles of streams and 2.6 million surface acres of lakes inhabited by resident and anadromous fish species on BLM-administered lands in Alaska (Figure 1). Resident fish species are within 90 to 100 percent of their original populations except in isolated impacted or heavily fished areas. Impacts are from placer mining, roads and oil and gas development, harvest (usually in the form of heavy sport and subsistence fishing), and off-highway vehicle use.

Alaska's harsh climate makes management more complex than in other states. Many of Alaska's aquatic systems only provide seasonal habitat requiring resident species to migrate great distances to overwinter. Winter habitat is assumed to be a crucial limiting factor, especially in lotic habitat types. River and lake systems are relatively nutrient poor in comparison to systems in other states. As a result, fish species exhibit slower growth rates, longer lifespans, and sexual maturity at later ages. Species like lake trout, Dolly Varden, and Arctic char may spawn only every second or third year. Promoting use (e.g., recreational fishing) while protecting sensitive fishery resources which are susceptible to increased fishing pressures and developmental activities requires sound management strategies based on sound baseline habitat and population data.

Twenty-two species of resident fishes are known to exist on BLM lands in Alaska. The most abundant species is the Arctic grayling, followed by several varieties of whitefish, which are used predominately by rural residents for subsistence. Anadromous species greatly overshadow resident species because of their commercial and sporting values. However, several resident species are valued by anglers, such as rainbow trout, lake trout, Arctic char, northern pike, Dolly Varden, and Arctic grayling.

Access will always be a physical challenge in Alaska due to remoteness, location of private lands, and the difficulty in building access points because of the harshness of the environment. There are opportunities to develop access for affordable recreational fishing, however.

Information is limited for Alaska's vast resources. In general, inventories and information on resident species distribution, species occurrence, relative abundance, preferred habitat, crucial use habitats, habitat availability, habitat condition, and instream flow needs are extremely limited or do not exist. As a result, the thrust of Alaska's efforts for resident fish will be to gather the necessary information to support long- and short-term management decisions (Table 4).

Figure 1. Alaska

Table 4. Alaska's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (107,440 miles) Lakes and reservoirs (443,060 acres)	5,124
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (26) Plans needing revision (6) Plans to be implemented (32)	4,509
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (4) Plans to be prepared (7)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (31)	1,395
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (9) Agreements (89)	464
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (20) Maintenance (360)	9,505
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (0) Easements (3) Land exchanges (0)	2,500
Objective 8. Identify and design resident fish research.	Research Projects Studies (14)	1,275
	Total	24,772

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Arizona

Arizona's arid environment offers interesting opportunities for managing fish. There are no coldwater recreational fisheries on BLM-administered lands and what warmwater fisheries exist, other than in the Colorado River, are confined to occasional small reservoirs and short stretches of the Gila River (Figure 2). BLM's role in recreational fisheries management is growing as more emphasis is placed on recreational fishing. There are considerable opportunities to expand recreational fisheries on BLM-administered lands where no conflict exists with native fish.

A wide array of fish are native to Arizona, including saltwater species. The majority of native fish species in Arizona are imperiled, some more so than others. One species, the Monkey Springs pupfish, is extinct. Several species exist only outside Arizona, and others are present only because they have been reintroduced. Three saltwater species only occur during the rare instances when the Colorado River flows all the way to the Gulf of California. All native fish are reduced in range and numbers. The program emphasis for native fish in Arizona is to inventory for their presence, monitor their welfare, and reintroduce them where appropriate.

Most of the recreational fisheries program on BLM-administered land in Arizona is managed by the Yuma District along the lower Colorado River. What was once a great warmwater fishery has declined due to a loss of underwater feeding and hiding habitats. The Arizona Game and Fish Department and the California Department of Fish and Game, Bureau of Reclamation, fishing clubs, and corporate partners have teamed up to initiate a plan for the benefit of the fishery contained in Lake Havasu.

The Lake Havasu Fisheries Improvement Program began in 1992. The goals of the program are to enhance game fish and native fish populations in the lake, improve shore-based access, and provide amenities like restrooms, parking, and shade. There are also ongoing programs to enhance fishing opportunities along the river above and below Lake Havasu. The tremendous amount of year-round recreational use in this area makes it a perfect place to showcase a major fisheries program that satisfies fishing demand (Table 5).

Figure 2. Arizona

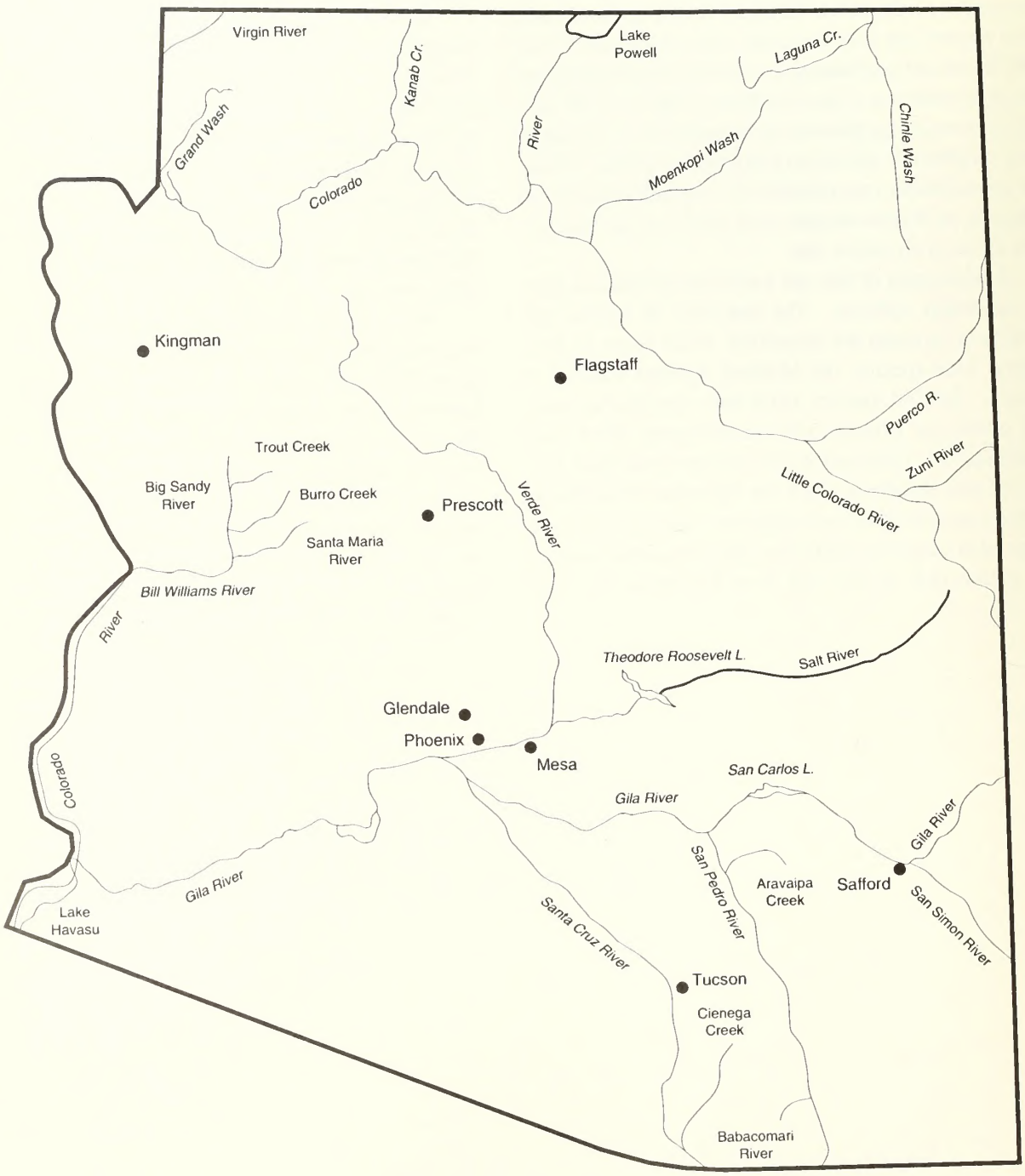


Table 5. Arizona's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (1,400 miles) Lakes and reservoirs (51,000 acres)	131
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (23) Plans needing revision (2) Plans to be implemented (3)	113
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (10) Plans to be prepared (13)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (70)	984
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (37) Agreements (11)	168
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (37) Maintenance (5)	30,633
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (2) Easements (5) Land exchanges (3)	6,430
Objective 8. Identify and design resident fish research.	Research Projects Studies (3)	200
	Total	38,659

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

California

California is one of the most habitat-diverse places on earth. This diversity is well represented in the 3,500 miles of streams and the 50,000 lake and pond surface acres administered by BLM. These aquatic systems range from the arid expanse of the southern California desert, north beyond the snow-capped Sierra Nevada, and west to the Pacific Coast (Figure 3), and include the northwest corner of Nevada.

The significance of BLM resident fish resources in California cannot be overestimated. Given California's human population of over 32 million, there is a great need for conservation of fisheries resources. The most important value of fisheries is their role in maintaining biodiversity of an ecosystem. All creatures play a role in the biological diversity of an area. BLM has greater diversity on its land than any other agency in California. Another important value of the fisheries resources is the benefits they accrue to the communities whose businesses sell fishing equipment, guide services, food, and lodging to the visiting fishing public. It is estimated that over 750,000 days of fishing, worth $10 million, take place annually on public lands in California.

California has 132 identified fish species in its waters (Moyle 1975). Of the 116 native species and subspecies (Moyle 1991), 67 are endemic to California (Moyle et al. 1989; Moyle pers. commun. [10/8/92]). Ten native species are Federally listed as threatened or endangered, and an additional eight are identified in the *Special Status Fishes Habitat Management* plan. Of the remaining 98 native species, 35 are identified as California Fish Species of Special Concern (Moyle et al. 1989). With over 50 percent of the native species either at risk of extinction or in decline (Moyle pers. commun.), much focus is being placed on maintaining the native fish diversity. Although there are few pristine aquatic systems remaining, there are several with intact native fish communities that are managed by BLM in California.

In general, inventories and habitat evaluations on resident fish need to be updated. More studies on the habitat requirements for the species need to be conducted so that sound management plans can be developed. Additional work on the taxonomy of many of the species is also needed. Because of the multitude of systems with mixed land ownership, emphasis will be placed on habitat management plans that are based on watershed-level analysis. These plans will be integrated and coordinated with RMPs to ensure healthy and properly functioning aquatic ecosystems. In addition to managing for native resident fish, with the dense population centers located in California, management will begin looking at more recreational fishing opportunities (Table 6).

Figure 3. California

Table 6. California's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (4,660 miles) Lakes and reservoirs (4,260 acres)	2,165
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (49) Plans needing revision (5) Plans to be implemented (99)	3,360
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (6) Plans to be prepared (8)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (46)	5,380
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (120) Agreements (41)	700
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (17) Maintenance (14)	440
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (15) Easements (12) Land exchanges (25)	9,700
Objective 8. Identify and design resident fish research.	Research Projects Studies (25)	1,550
	Total	23,295

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Colorado

Colorado is uniquely situated at the heart of the Rocky Mountains. It is the birthplace of seven major river systems: the South and North Plattes, Republican, Arkansas, Rio Grande, San Juan, and Colorado (Figure 4). All but one—the Republican River—have tributaries that arise from the Continental Divide. BLM administers over 8 million acres of lands in Colorado that contain 2,600 miles of streams and 17,600 lake and reservoir surface acres. These public aquatic resources provide habitat for resident fish in 1,900 stream miles and all 17,600 lake and reservoir surface acres.

There are 89 species of fish found in Colorado. These include 82 resident fish (endemic to the U.S.) and 53 fish native to Colorado. Eleven native fish are currently listed as Federal or State threatened or endangered species.

Colorado has some of the most sought-after fisheries in the country. Over 1 million anglers contribute $600,000 in license fees to the state's economy. It is estimated that BLM lands provide 934,000 fishing recreation visitor days that generate over $14 million in revenue to the state each year.

The primary responsibility of BLM's fisheries program in Colorado is to provide managers with the best and most current fish habitat information available to 1) make land use and planning decisions; 2) conduct habitat impact assessments; and 3) protect, maintain, and improve habitat conditions for threatened and endangered, native, nongame, and game fish species (Table 7).

Figure 4. Colorado

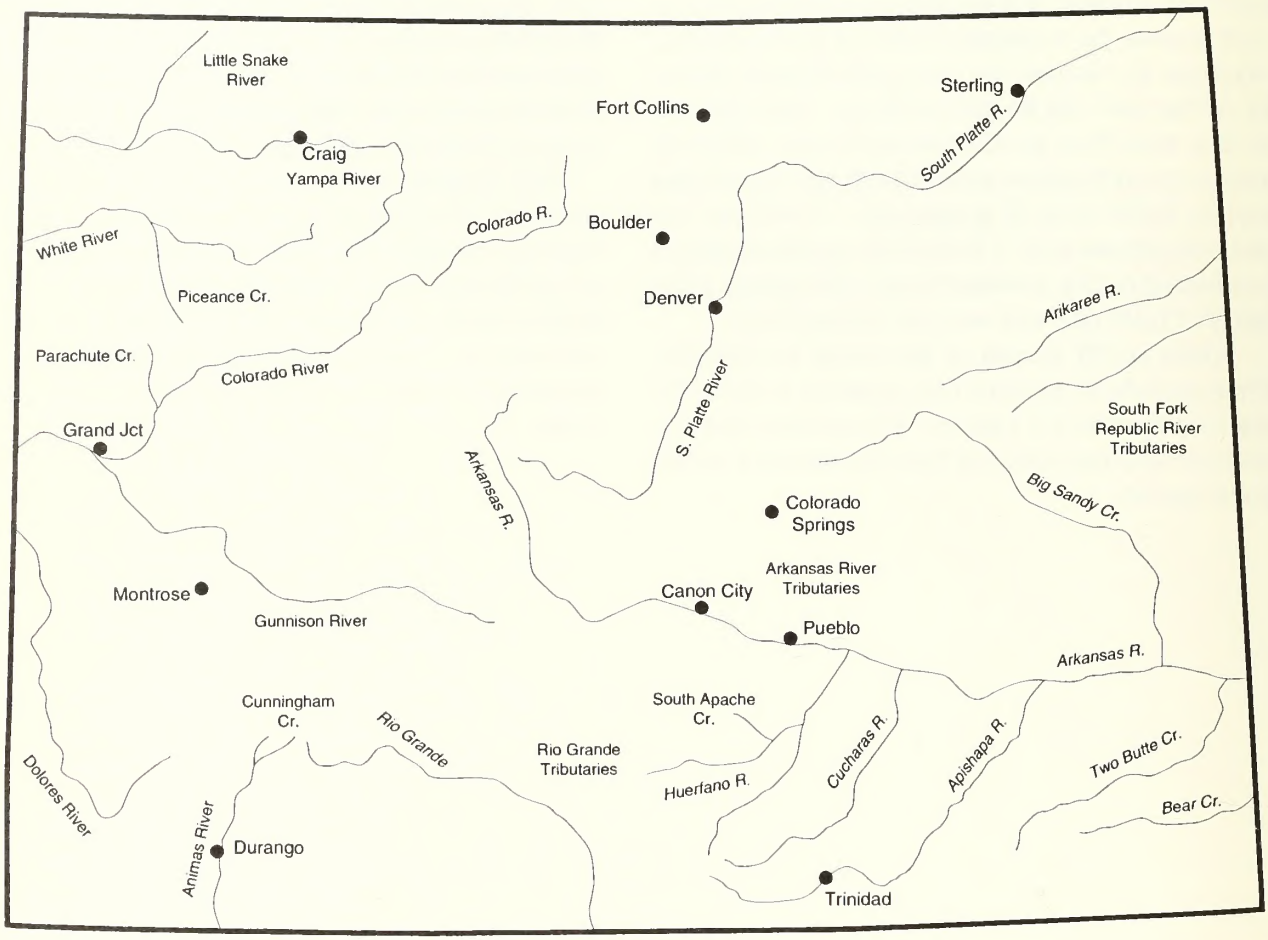


Table 7. Colorado's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (2,790 miles) Lakes and reservoirs (14,000 acres)	1,024
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (25) Plans needing revision (15) Plans to be implemented (50)	164
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (10) Plans to be prepared (2)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (45)	250
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (70) Agreements (12)	350
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (17) Maintenance (8)	440
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (9) Easements (9) Land exchanges (6)	1,960
Objective 8. Identify and design resident fish research.	Research Projects Studies (18)	437
	Total	4,625

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Eastern States

BLM's Eastern States (Figure 5) have jurisdiction over a variety of wetland resources, but these parcels, which contain wetlands or are adjacent to waterways or lakes, are scattered and small. The Eastern States do not have any administrative authority for any sizeable stream or lake habitats. Current management authority exists only for limited islands and wetland areas that contain some resident fisheries.

Because of limited resources, inventory and general information on resident species distribution, occurrence, relative abundance, habitat needs, etc., are restricted or nonexistent. Current management is focused on collecting baseline data to support Eastern States educational goals and management as they relate to the *Recreational Fishing Policy* (Table 8).

Figure 5. Eastern States

Table 8. Eastern States' Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (20 miles) Lakes and reservoirs (3,620 acres)	83
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (2) Plans needing revision (0) Plans to be implemented (0)	13
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (0) Plans to be prepared (2)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (0)	0
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (2) Agreements (2)	20
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (0) Maintenance (1)	10
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (0) Easements (0) Land exchanges (1)	48
Objective 8. Identify and design resident fish research.	Research Projects Studies (2)	130
	Total	304

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Idaho

Idaho has a wide variety of fish habitat types ranging from high mountain lakes to desert streams. In Idaho BLM manages 2,570 miles of streams, and 30,147 lake, pond, and reservoir surface acres. Of these waterways, 448 miles of streams are within Areas of Critical Environmental Concern and 354 miles of streams are within Wilderness Study Areas (Figure 6).

There are 72 species of fish in Idaho, of which 30 are native. Ten of the native fish species have been identified as special status fish because either their populations are at risk due to habitat loss or they were always uncommon or limited in range.

Much of the BLM fisheries habitat in Idaho is within mixed land ownership. This presents opportunities for integrated and coordinated resource management planning. In addition, fisheries management in Idaho places special emphasis on acquisition of easements and properties that would ensure access for recreational fishing and would consolidate land ownership to make critical fisheries habitat more manageable (Table 9).

Basic inventory data needed to identify management opportunities and assess the overall health of fisheries related ecosystems is lacking in Idaho. Increased monitoring capabilities are also necessary to ensure that management objectives are met and that the desired results are achieved.

Idaho has long been a destination for fishing enthusiasts from around the country. Recreational fishing opportunities have not kept pace with the demand placed on the resource due to increased interest in fishing. BLM in Idaho is looking to improve not only the quantity of fishing opportunities, but the quality as well.

Fisheries management in Idaho emphasizes biodiversity and preserving genetic purity of native fish populations, and attempts to deal with the formidable task of developing land management programs to protect fish species. Idaho is also addressing the need for information about population processes for the protection of threatened and endangered species.

Figure 6. Idaho

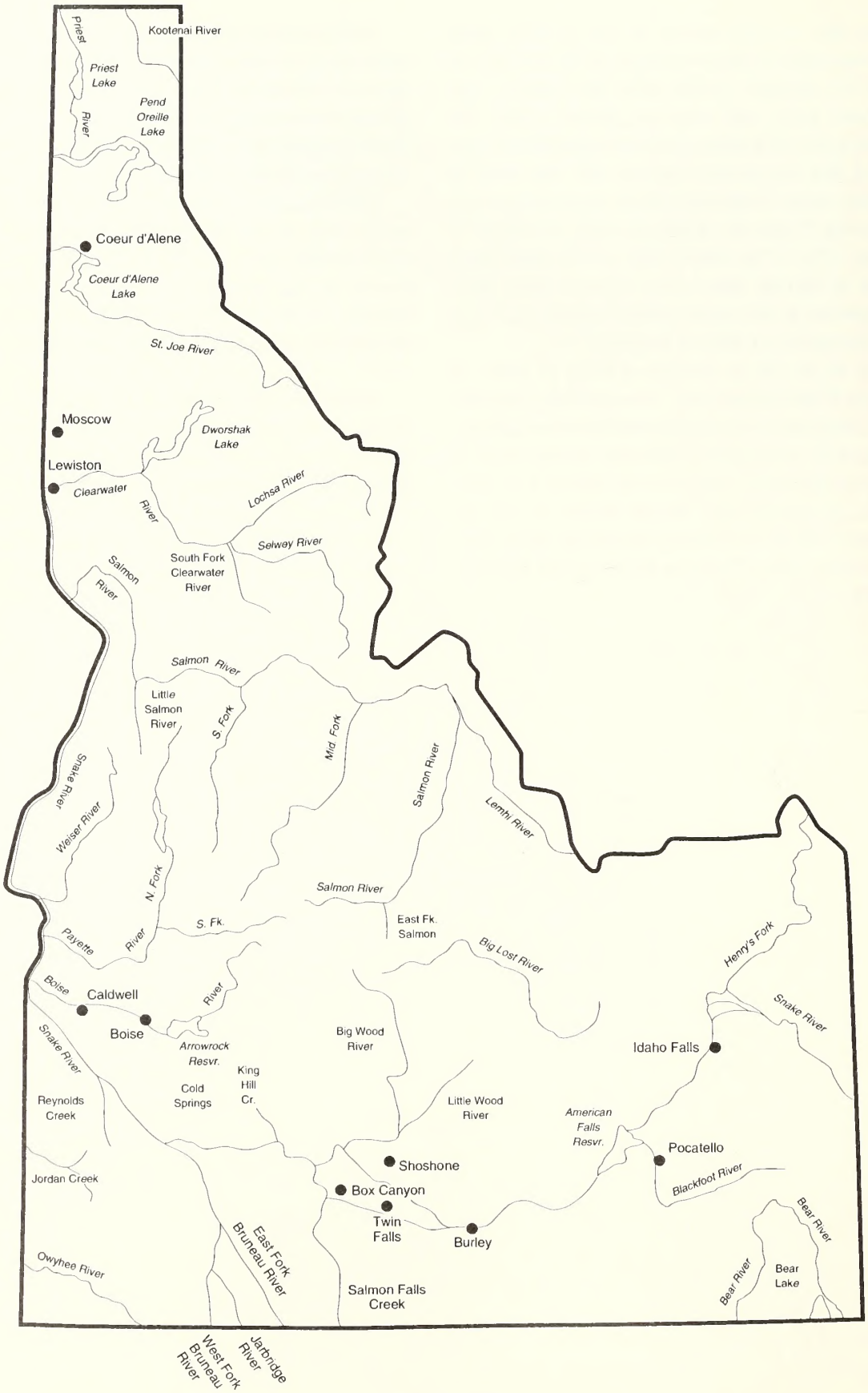


Table 9. Idaho's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (2,820 miles) Lakes and reservoirs (750 acres)	1,417
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (57) Plans needing revision (22) Plans to be implemented (76)	2,475
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (7) Plans to be prepared (10)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (37)	1,876
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (113) Agreements (10)	656
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (18) Maintenance (56)	8,797
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (15) Easements (13) Land exchanges (2) Acquisitions (9)	3,454
Objective 8. Identify and design resident fish research.	Research Projects Studies (7)	730
Total		19,405

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Montana

Montana is the only state with headwaters of rivers flowing into the Gulf of Mexico, Hudson Bay, and the Pacific Ocean. Waters from the Missouri, Little Missouri, and Yellowstone Rivers reach the Gulf of Mexico by way of the Mississippi River; the Belly and Saint Mary Rivers flow to Hudson Bay through the Saskatchewan-Nelson river system; and waters from the Kootonai and Clark Fork Rivers reach the Pacific Ocean via the Columbia River (Figure 7). Montana is home to the only major undammed river in the lower 48 States, the Yellowstone.

Montana is described as the last best place. This is due in part to the fishery resources in the state, the renowned blue ribbon trout streams such as the Madison, Jefferson, Gallatin, Missouri, Yellowstone, Bighorn, and Big Hole Rivers. The western portion of Montana is known for its trout fishing, while central and eastern Montana warmwater fisheries are relatively unknown. BLM administers over 8 million surface acres of public land in Montana, which includes fishery resources of 720 miles of streams and 6,670 acres of ponds and lakes. However, 2 to 3 million acres of BLM land are in scattered tracts and are difficult to manage. Many of these tracts are associated with valuable fisheries, but legal access for fishing is a problem.

There are 86 species of fish in Montana; 53 are considered native, 3 possibly native, and 30 introduced. One native, the cutthroat, has two subspecies. The pallid sturgeon is endangered and the Arctic fluvial grayling is being considered for listing as endangered or threatened in 1993.

In 1985, the total direct expenditures for fishing in Montana were $99.7 million, with $52.4 million for streams and $47.3 million for lakes. Nonresident expenditures totaled $54.3 million and resident $45.4 million. Fishing pressure has increased significantly in the 8 years since this data was collected. Many blue ribbon trout streams in private ownership permit "pay for fishing," with costs ranging from $40 to $60 per mile of stream per day or $25 to $40 per rod per day without guide service.

Other than riparian-wetland inventory data, BLM in Montana depends on the Montana Department of Fish, Wildlife, and Parks for all of its fisheries data, as BLM has no fisheries biologists in Montana. The main thrust has been to acquire instream flow and water rights for the future maintenance of fish habitat. Land exchanges are needed to block up BLM ownership to allow for better management. Inventories and habitat evaluations need to be completed so management actions can be implemented to fulfill BLM's management responsibilities (Table 10).

Figure 7. Montana

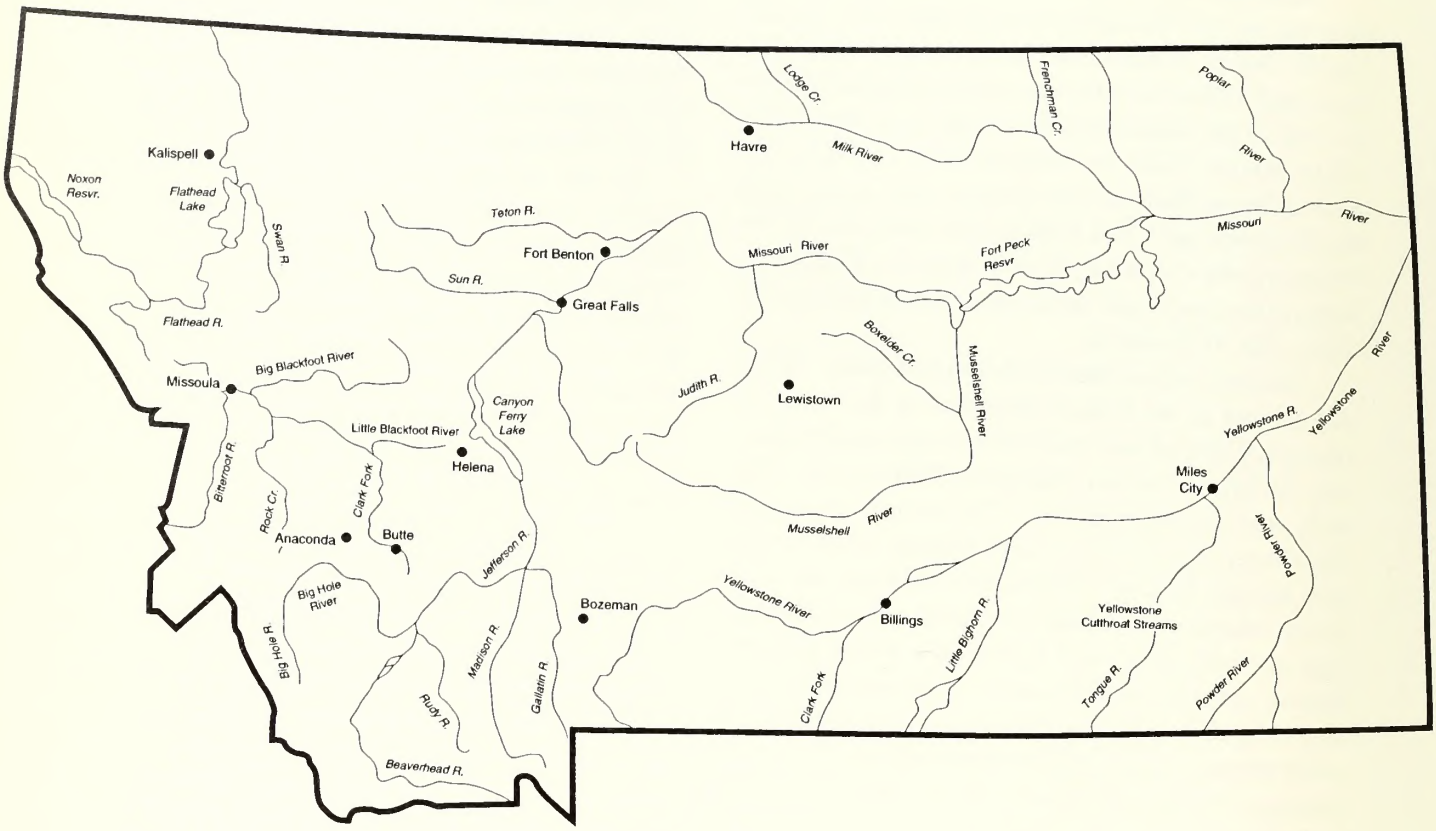


Table 10. Montana's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (510 miles) Lakes and reservoirs (1,092 acres)	1,800
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (197) Plans needing revision (73) Plans to be implemented (45)	3,400
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (0) Plans to be prepared (2)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (10)	1,000
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (8) Agreements (2)	10
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (4) Maintenance (8)	15,800
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (4) Easements (6) Land exchanges (19)	5,000
Objective 8. Identify and design resident fish research.	Research Projects Studies (3)	261
	Total	27,271

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Nevada

Nevada is the most arid state in the nation. However, it does not follow that Nevada therefore lacks fish habitat. While many of the streams in Nevada are quite small, portions of major river systems, like the Snake and the Colorado, run through the state (Figure 8). The 48 million acres of public lands administered by BLM in Nevada vary from high, snowcapped mountains to low desert regions and encompass over 2,600 miles of streams and over 34,000 pond, lake, and reservoir surface acres.

Almost 70 species of fish occur on BLM-administered lands in Nevada; 45 of these species are natives. Approximately one-third of the fish habitat in Nevada is occupied by special status species (Federal endangered, threatened, and candidate species). In a state where water has always been scarce, an increasing demand for the limited supply has accompanied residential and industrial development. Increased water consumption and impacts to riparian/aquatic systems from conflicting uses has resulted in many of these systems, and the species in them, being at risk.

Not only are the ecosystems and species at risk, but water-based recreation, including fishing, which is a favorite pastime of Nevadans, may also be at risk. It is estimated that 3 million fishing days per year are spent on BLM-administered lands in Nevada. Utilization of the fishery resource results in the expenditure of approximately $135 million per year, which benefits the communities that provide fishing equipment, food, lodging, and gasoline for recreationists.

Inventories and habitat evaluations on resident species are needed in Nevada to ensure sufficient information is available to develop integrated management plans. Information on life history, habitat requirements, and taxonomy of resident species is also needed. Comprehensive management plans, aimed at enhancing aquatic habitat and associated watersheds to improve and maintain natural diversity and distribution patterns of fish, and enhancing recreational fishing opportunities are lacking in Nevada at this time. Implementation of existing plans identifying actions to protect, restore, and enhance healthy, properly functioning riparian/aquatic ecosystems may be accelerated by increasing awareness of the value of the resident fish resource both within BLM and with the public (Table 11).

Figure 8. Nevada

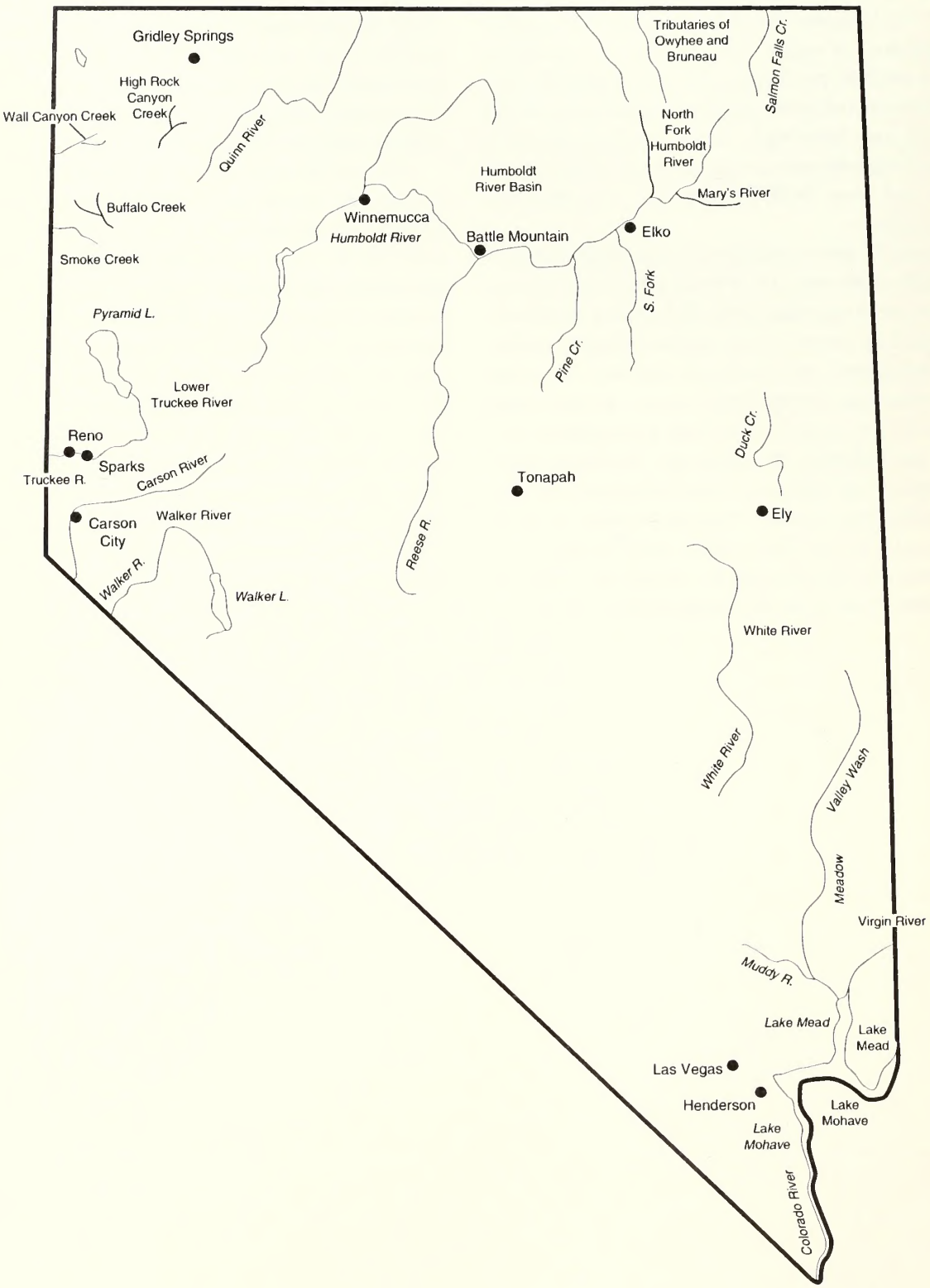


Table 11. Nevada's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (480 miles) Lakes and reservoirs (12,250 acres)	606
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (50) Plans needing revision (21) Plans to be implemented (43)	1,785
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (7) Plans to be prepared (6)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (176)	1,376
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (64) Agreements (0)	224
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (9) Maintenance (14)	2,178
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (4) Easements (7) Land exchanges (0)	1,330
Objective 8. Identify and design resident fish research.	Research Projects Studies (30)	300
	Total	7,799

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

New Mexico

New Mexico is one of the most arid states in the nation, but has numerous hydrographic regions ranging from Arctic alpine to lower Sonoran Desert. The state is bisected by the Continental Divide and drained by five major river systems: the Canadian, Pecos, Rio Grande, San Juan, and Gila. In the center of the state, nearly 6,000 square miles lie within the closed Tularosa Basin. BLM administers nearly 13 million acres of public land in New Mexico with only about 370 miles of perennial streams and 3,820 surface acres of lakes (Figure 9). While these waters have not been intensively inventoried, fish have been observed in some 260 miles of streams and 120 acres of lake habitat.

Due to the diverse topographic and hydrographic features within the state, there are about 100 resident fish species. Of these, 61 species are native to New Mexico. Twenty-seven native fish are currently listed as Federal or State threatened or endangered species.

Due to the fact that fishery resources on BLM-administered lands are relatively scarce within New Mexico, the demand for them is significant. BLM-administered lands in the Farmington and Taos Resource Areas provide access to some of the finest trout fishing waters in the country. Throughout New Mexico there are some 260,000 licensed anglers spending 2,161,000 recreational fishing days in the field. In 1991 these anglers caught some 6,000,000 fish and expended nearly $170 million in the process (Hatch pers. commun.).

Knowledge of the fisheries resources on BLM-administered lands within the State of New Mexico is limited at best. As a result, the first priority is to conduct an inventory of basic aquatic resources to delineate habitat condition, species occurrence, population status, and habitat requirements. An inventory of this kind could result in a significant increase in knowledge of resident fisheries distribution in New Mexico. Protection and enhancement of fisheries resources begins with a basic understanding of which resource values require management.

Once baseline inventories have been completed in New Mexico, monitoring studies need to be established to determine population dynamics and habitat trends. Aquatic resource values could then be included in basic interdisciplinary planning and ecosystem management of resources resulting in the enhancement of biological diversity (Table 12).

Figure 9. New Mexico

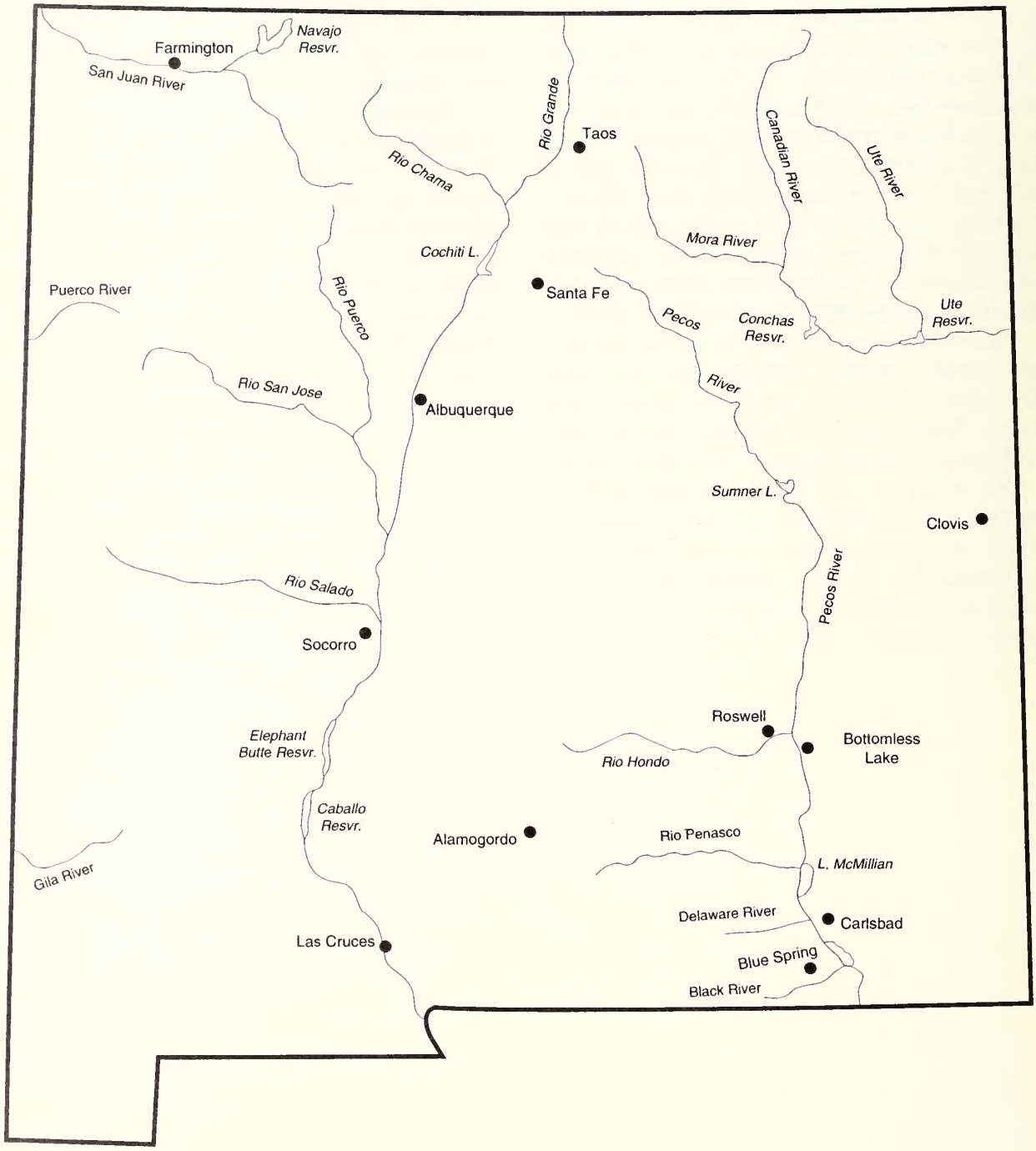


Table 12. New Mexico's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (366 miles) Lakes and reservoirs (3,821 acres)	245
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (8) Plans needing revision (4) Plans to be implemented (10)	142
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (6) Plans to be prepared (2)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (45)	250
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (12) Agreements (5)	80
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (3) Maintenance (4)	2,590
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (12) Easements (4) Land exchanges (7)	540
Objective 8. Identify and design resident fish research.	Research Projects Studies (3)	620
	Total	4,467

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Oregon/Washington

Oregon and Washington have enjoyed a long history of fishery riches. Drained by the Columbia and Snake River systems and numerous smaller coastal stream systems, as well as by river systems that arise in inland mountain ranges and sink into the desert basins, the numerous and varied waters in the area produced diverse and plentiful aquatic resources.

These aquatic resources drew and sustained Native Americans throughout a vast area from the Rocky Mountains to the Pacific Ocean and south to the deserts of modern-day Nevada. Harvest and use of resources were critical both to their survival and their spiritual needs. These resources were highly praised and traded for by other peoples living outside the region, eventually including Europeans, who first arrived along coastal areas and then came overland from the interior. As Europeans migrated into the region, aquatic resources also became critical to their success in establishing permanent settlements.

Today, much time has passed and many things have changed, including our dependence on these resources for material survival. Instead they have now become increasingly vital to our mental and spiritual health and survival. The 3,518 miles of fish-bearing streams and 32,770 acres of fish-bearing lakes and ponds found on BLM-administered lands throughout Oregon and Washington are increasingly sought out by people searching for an escape from the stress of daily living (Figure 10). Accompanying this is the realization by the public that the biological integrity of these aquatic ecosystems must be protected.

Aquatic ecosystems on public lands in Oregon and Washington support 44 species of fish, including 38 species of resident fish, with 31 of these native to Oregon and Washington. Seven of these native fish species are currently Federally listed as threatened or endangered and one is proposed for listing. An additional 17 species are identified in the Bureau's *Special Status Fishes Habitat Management* plan.

The challenge facing Oregon and Washington is to manage these aquatic ecosystems to not only provide for the public's benefit and enjoyment today, but also to provide for the long-term biological integrity of these same ecosystems for future generations. To effectively meet this challenge, inventories and habitat evaluations must be updated and information acquired on the taxonomy of many species to develop integrated watershed-level plans designed to manage for healthy, functioning watershed and aquatic ecosystems. The intermixed land ownership found over much of Oregon and Washington adds to the complexity of this task and requires extensive coordination with other landowners in the development of these plans. Finally, a long-term monitoring program is needed to support the adaptive management required at the landscape level (Table 13).

Figure 10. Oregon/Washington

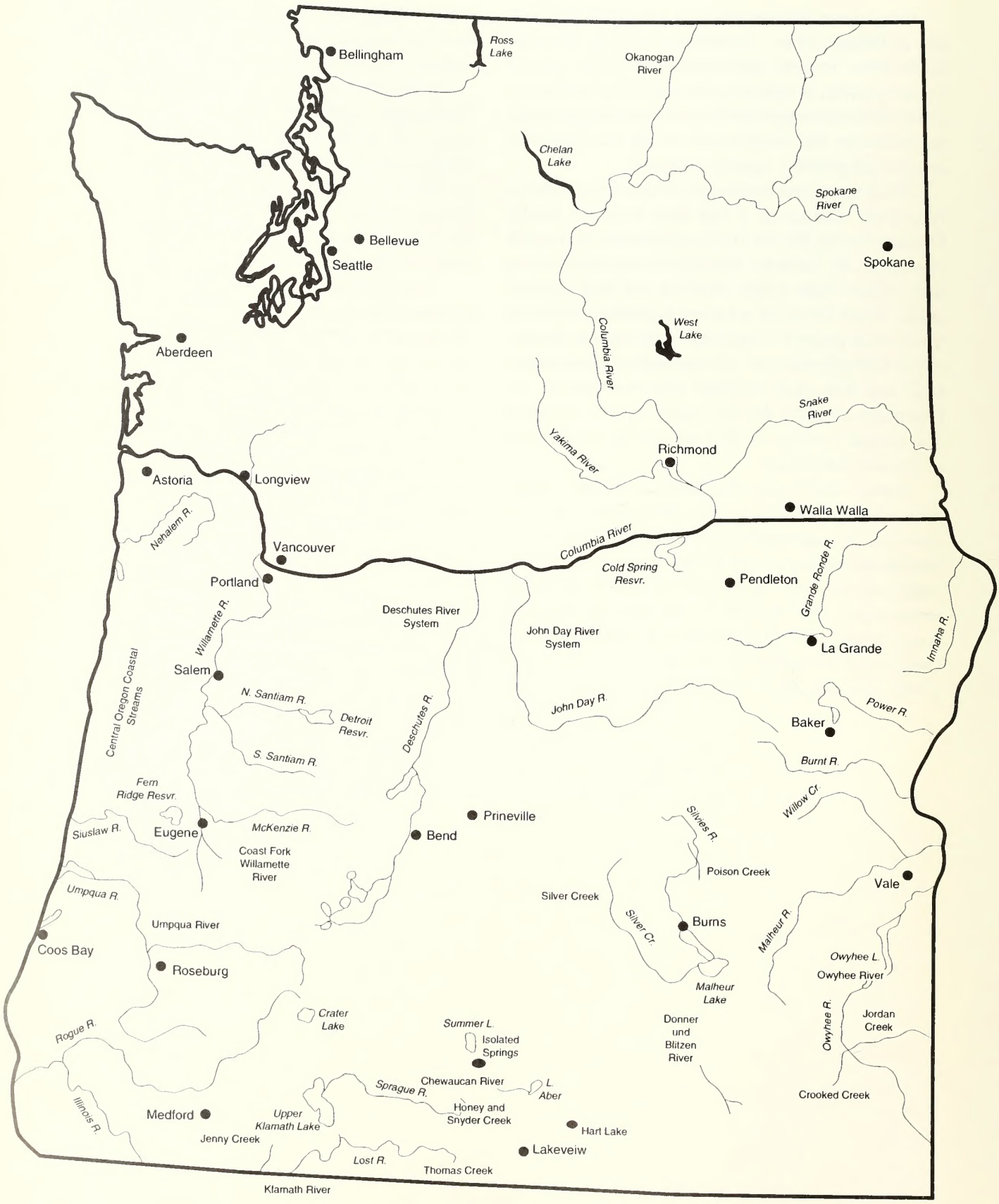


Table 13. Oregon/Washington's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (2,895 miles) Lakes and reservoirs (7,720 acres)	1,845
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (97) Plans needing revision (6) Plans to be implemented (68)	5,160
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (8) Plans to be prepared (5)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (49)	4,900
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (33) Agreements (71)	543
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (16) Maintenance (11)	4,072
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (1) Easements (6) Land exchanges (2)	1,926
Objective 8. Identify and design resident fish research.	Research Projects Studies (35)	1,269
	Total	19,715

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Utah

Utah is situated in the Great Basin and is the second driest state in the nation. Over 3,390 miles of streams and 15,230 surface acres of lakes and reservoirs are on public lands administrated by BLM. BLM administers over 22 million acres of land in Utah (Figure 11).

There are 74 species of resident fish found in Utah. Eight fish are currently listed as Federal endangered and threatened species. An additional 10 species are listed by the State of Utah as threatened or sensitive. A vast majority of these species occur on BLM-administered lands.

Utah has over 433,000 licensed anglers that contribute over $106,000,000 to the state's economy (USDI and USDC, 1985). It is estimated that BLM-administered lands provide 20 percent of the fishing recreation visitor days and contribute approximately $200,000 in revenue to the state economy each year.

The primary responsibility of the fisheries program in Utah will be to protect, maintain, and improve habitat conditions for threatened and endangered, native, nongame, and game fish species. Emphasis will be placed on managing fish habitats based on watershed-level analysis and development of coordinated RMPs to ensure healthy and properly functioning aquatic ecosystems. In general, inventories and habitat evaluations on resident fishes need to be updated so that sound management plans can be developed and decisions made (Table 14).

Figure 11. Utah

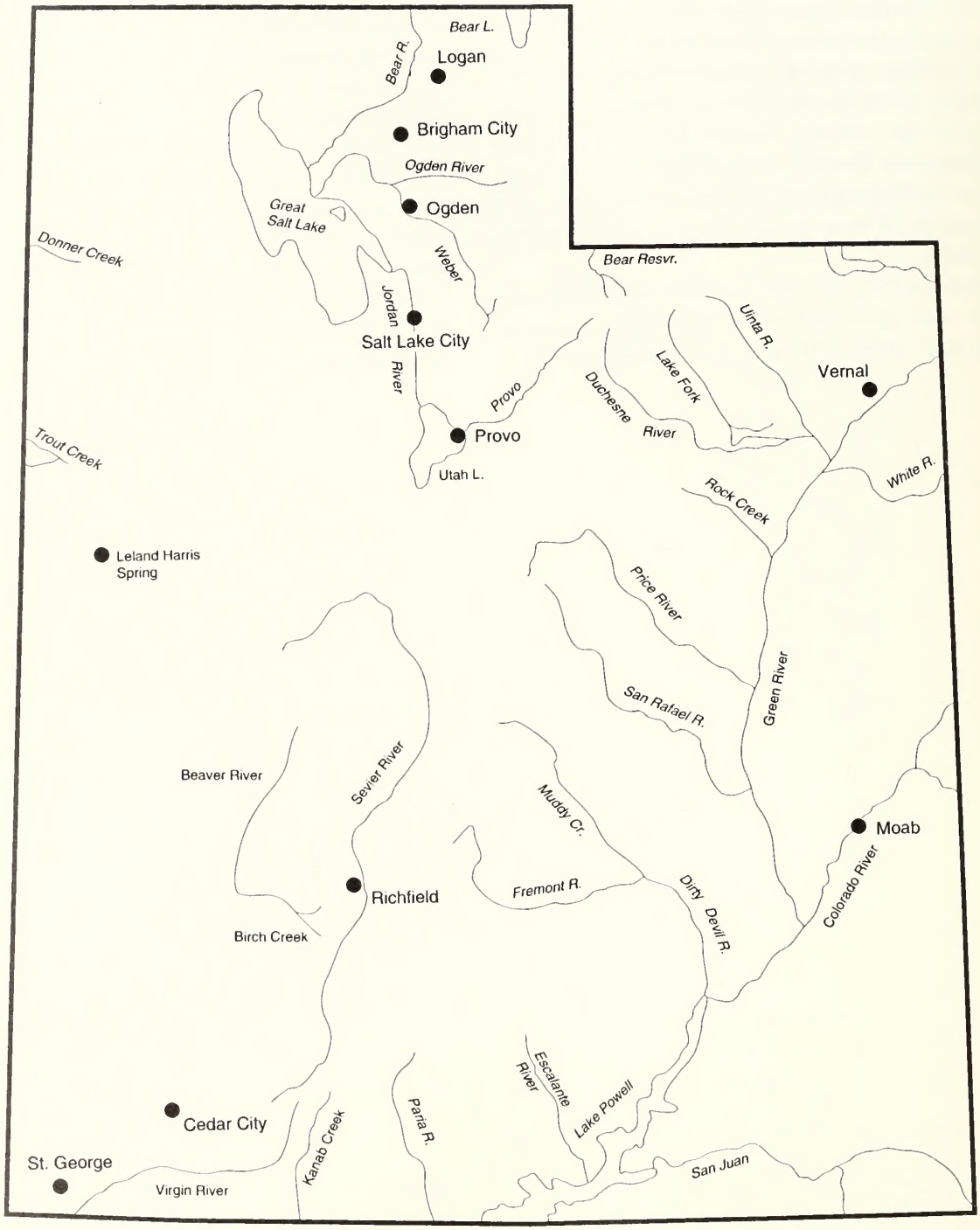


Table 14. Utah's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (3,390 miles) Lakes and reservoirs (15,230 acres)	1,015
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (21) Plans needing revision (14) Plans to be implemented (49)	477
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (9) Plans to be prepared (8)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (36)	300
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (60) Agreements (10)	330
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (8) Maintenance (7)	135
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (1) Easements (6) Land exchanges (2)	88
Objective 8. Identify and design resident fish research.	Research Projects Studies (10)	276
	Total	2,621

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

Wyoming

Wyoming is a headwaters state, providing water to 14 USGS basin subregions. Headwaters systems include the following: Madison, Yellowstone, Bighorn, Tongue, Powder, Little Missouri, Cheyenne, Niobrara, Green, and Snake. In addition, the North Platte River drains about one-fourth of the state (Figure 12).

BLM has identified 1,926 miles of streams and rivers and 6,434 acres of ponds, reservoirs, and lakes known to have resident fish habitat on public lands. Very little of this habitat is covered by fisheries objectives in activity plans.

Stream habitats in Wyoming vary from a few large rivers to innumerable small streams. Manmade structures make up the majority of BLM lentic habitats in Wyoming; these include everything from small livestock watering ponds to large reservoirs for which BLM may manage only access sites.

Wyoming is home to 54 native fish species. However, most of Wyoming's waters, whether natural or manmade, have been planted with or infiltrated with nonindigenous species, subspecies, or hybrids. Twenty-two additional species have been introduced. Most of these introductions have been to enhance recreational fishing. Forty-three of the native species and eight of the introduced species are known to occur in BLM waters in Wyoming.

Fishing generated $194 million in expenditures in Wyoming in 1991; there were just over 4 million recreation days of fishing in Wyoming that year. Although BLM manages approximately 30 percent of the land mass in Wyoming, only 10 to 15 percent of the state's fishing pressure is estimated to occur on BLM lands.

There are 1,266 miles of rivers and streams as well as 3,283 acres of ponds, lakes, and reservoirs on BLM lands in Wyoming (Table 15) which need Level III Inventories (USDI, 1993). There are 16 new activity plans to be developed and 14 plans to be revised. There are 60 activity plans to be implemented. Wyoming has 19 recreational fisheries sites which are maintained on an annual basis. In addition there are 20 sites proposed for recreational fisheries developments. There are 12 watersheds that need land or water acquisitions to improve their manageability, including 14 sites identified as needing work on acquiring or establishing access for the public. There are six suggested research projects involving inventory and fish distribution studies.

During the next 8 years, BLM in Wyoming projects a need for approximately 20 new positions to meet the goals of this plan. These include two District fisheries biologist positions with the remaining positions consisting of technicians and support personnel.

Figure 12. Wyoming

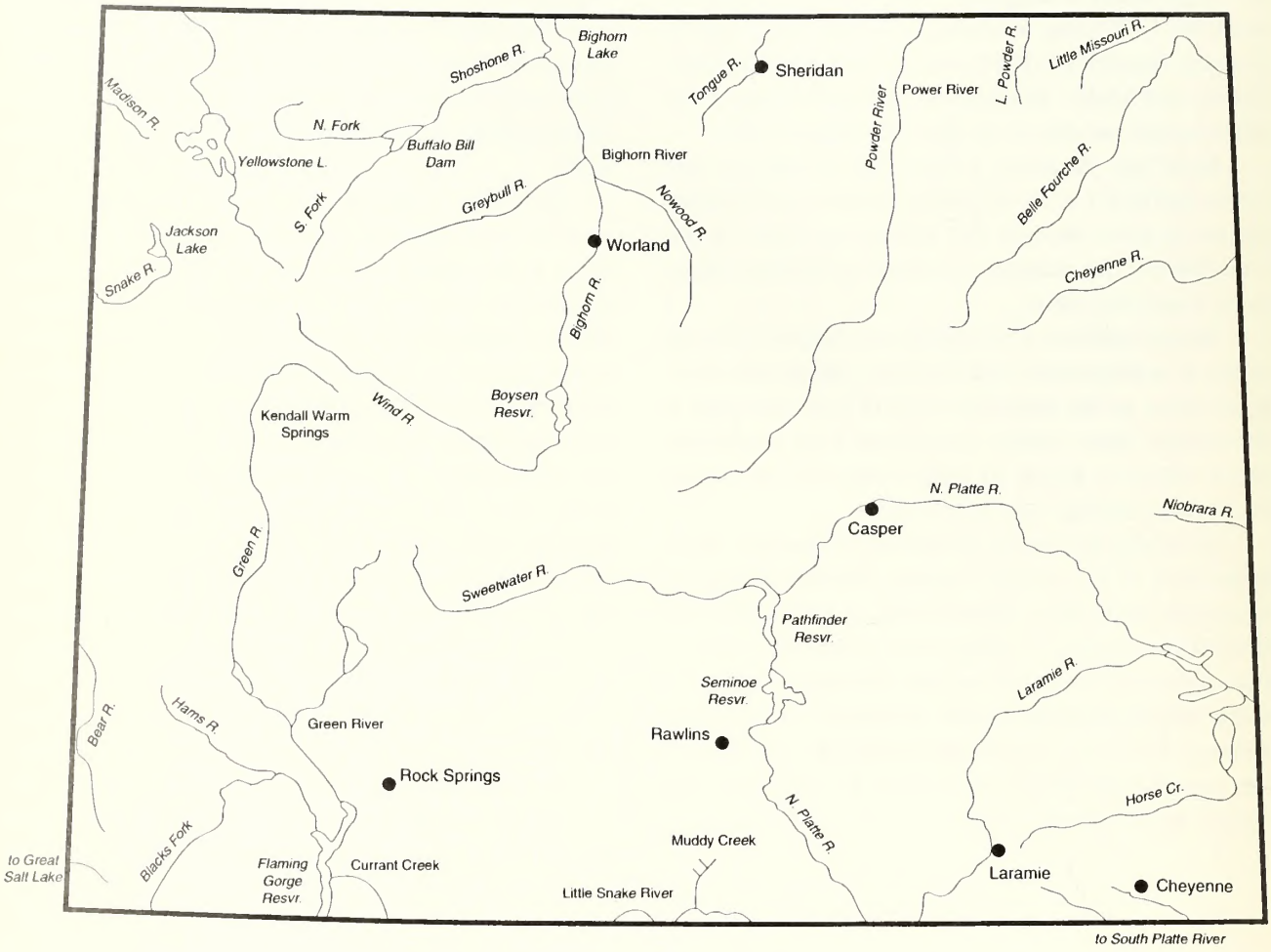


Table 15. Wyoming's Implementation Strategy

Objective	Actions	Costs ($000)
Objective 1. Identify resident fishery management opportunities.	Inventory Needs Streams (2,711 miles) Lakes and reservoirs (10,400 acres)	1,408
Objective 2. Conduct watershed habitat management planning.	Activity Plans Plans needed (16) Plans needing revision (14) Plans to be implemented (60)	967
Objective 3. Ensure integrated watershed resource management planning.	Land Use Plans Plans needing review (9) Plans to be prepared (3)	N/A*
Objective 4. Protect and restore native fish habitat.	Projects Proposed projects (20)	354
Objective 5. Develop and promote public awareness and partnerships.	Outreach Projects and Agreements Projects (48) Agreements (27)	375
Objective 6. Develop, expand, and maintain fishery recreational sites.	Sites and Facilities Development and expansion (20) Maintenance (19)	1,865
Objective 7. Improve fishery habitat manageability.	Acquisitions and Exchanges Water rights (6) Easements (8) Land exchanges (6)	905
Objective 8. Identify and design resident fish research.	Research Projects Studies (6)	271
	Total	6,145

* Fishery costs are not projected because they are only a small component of overall land use planning costs.

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This report outlines the Bureau of Land Management's (BLM's) national strategy for managing resident fish species habitat. The report describes BLM's role in river, stream, and lake ecosystem management and recommends ways to improve conservation efforts relative to resident fish. Individual state strategies for all the BLM states are included.

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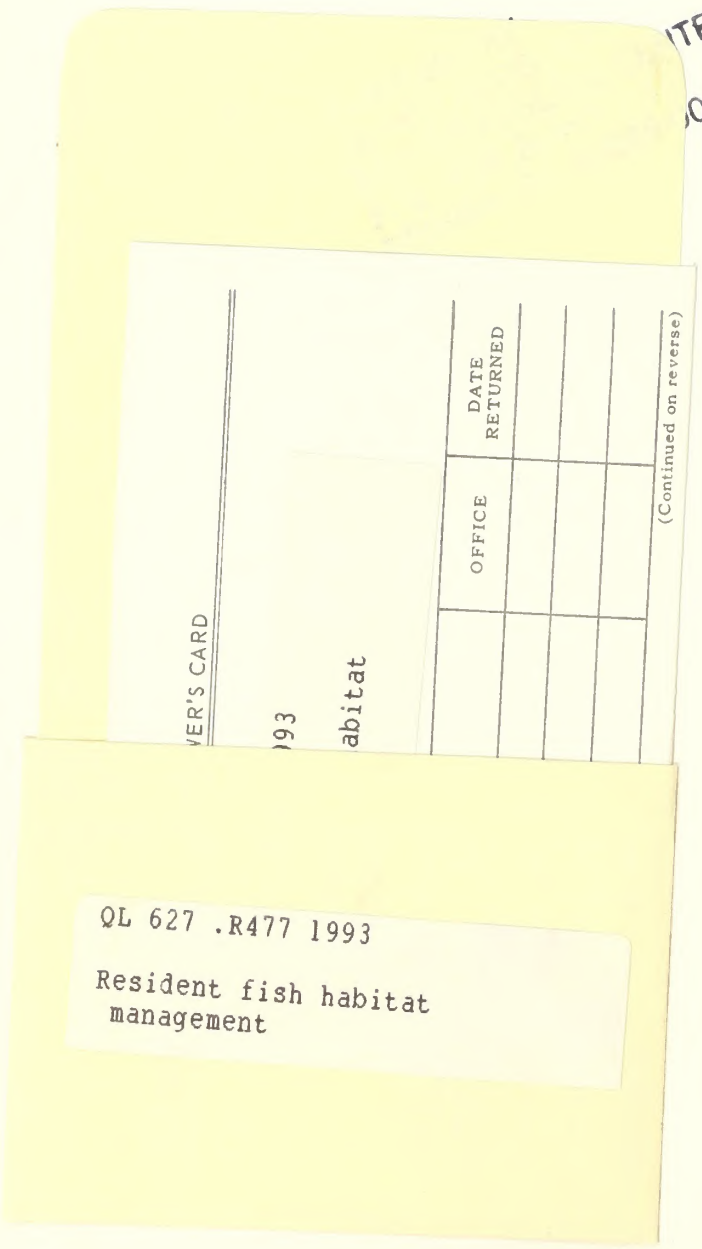
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